NEONATAL OUTCOME OF SPONTANEOUS AND INDICATED PRETERM BIRTHS - A COMPARATIVE STUDY

Dissertation submitted to

THE TAMIL NADU DR.M.G.R MEDICAL UNIVERSITY

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In fulfilment of the regulations for the award of the degree

M.D. DEGREEE IN PEDIATRICS

DEPARTMENT OF PEDIATRICS

PSG INSTITUTE OF MEDICAL SCIENCES & RESEARCH

PEELAMEDU , COIMBATORE – 641 004

APRIL 2016

DECLARATION

I hereby declare that this dissertation entitled **" NEONATAL OUTCOME OF SPONTANEOUS AND INDICATED PRETERM BIRTHS - A COMPARATIVE STUDY''** was prepared by me under the guidance and supervision of **Dr. SARAH PAUL,** Professor of pediatrics ,PSG Institute of Medical Sciences & Research, Coimbatore.

This dissertation is submitted to the Tamil Nadu DR. MGR Medical University in fulfilment of the University regulations for the award of MD Degree in Pediatrics . This dissertation has not been submitted elsewhere for the award of any other Degree or Diploma.

Dr. R .V. Saranyaa

CERTIFICATE BY THE GUIDE

This is to certify that the thesis entitled **" NEONATAL OUTCOME OF SPONTANEOUS AND INDICATED PRETERM BIRTHS - A COMPARATIVE STUDY "** is the bonafide work of **Dr. R .V. Saranyaa** done under my guidance and supervision in the Department of PEDIATRICS, PSG Institute of Medical Sciences and Research, Coimbatore, in fulfilment of the regulations of TheTamil Nadu Dr. MGR Medical University for the award of M.D degree in PEDIATRICS.

DR. SARAH PAUL

PROFESSOR

DEPARTMENT OF PEDIATRICS

CERTIFICATE BY THE HEAD OF THE DEPARTMENT AND THE PRINCIPAL

This is to certify that the thesis **" NEONATAL OUTCOME OF SPONTANEOUS AND INDICATED PRETERM BIRTHS - A COMPARATIVE STUDY''** is the bonafide work of **Dr. R .V. Saranyaa** done under guidance of **Dr. SARAH PAUL,**Professor of pediatrics, PSG Institute of Medical Sciences and Research, Coimbatore in fulfilment of the regulations of The Tamilnadu Dr. MGR Medical University for the award of M.D degree in PEDIATRICS.

Dr. JOHN MATTHAI
HEAD OF THE DEPARTMENT
DEPARTMENT Of PEDIATRICS

Dr. S .RAMALINGAM
PRINCIPAL
PSG IMS & R
COIMBATORE

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PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee

Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

May 9, 2014

To
Dr R V Saranyaa
Postgraduate
Department of Paediatrics
PSG IMS & R
Coimbatore

The Institutional Human Ethics Committee, PSG IMS & R, Coimbatore -4, has reviewed your proposal on 2nd May, 2014 in its expedited review meeting held at IHEC Secretariat, PSG IMS&R, between 10.00 am and 11.00 am, and discussed your study proposal entitled:

"Neonatal outcomes among spontaneous and indicated preterm births - a prospective cohort study"

The following documents were received for review:

1. Duly filled application form
2. Proposal
3. Informed Consent Forms
4. Parental Consent Forms
5. CV
6. Budget

After due consideration, the Committee has decided to approve the study.

The members who attended the meeting at which your study proposal was discussed are as follows:

Name	Qualification	Responsibility in IHEC	Gender	Affiliation to the Institution Yes/No	Present at the meeting Yes/No
Dr P Sathyan	DO, DNB	Clinician, Chairperson	Male	No	Yes
Dr S Bhuvaneshwari	M.D	Clinical Pharmacologist Member - Secretary	Female	Yes	Yes
Dr Sudha Ramalingam	M.D	Epidemiologist Alt. Member - Secretary	Female	Yes	Yes
Dr Y S Sivan	Ph D	Member –Social Scientist	Male	Yes	Yes

The approval is valid for one year.

We request you to intimate the date of initiation of the study to IHEC, PSG IMS&R and also, after completion of the project, please submit completion report to IHEC.

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Institutional Human Ethics Committee

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POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

This Ethics Committee is organized and operates according to Good Clinical Practice and Schedule Y requirements.

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Kindly note this approval is subject to ratification in the forthcoming full board review meeting of the IHEC.

Yours truly,

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COIMBATORE-641004.
INSTITUTIONAL HUMAN ETHICS COMMITTEE

Dr S Bhuvaneshwari
Member - Secretary
Institutional Human Ethics Committee

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ABSTRACT

Back ground : Preterm birth is a leading cause for neonatal morbidity and mortality contributing to the global economic burden . Outcome of preterm neonates based on clinical categorization into spontaneous and indicated preterm group provides knowledge about the morbidity pattern in each clinical subtype and to decide on medical intervention at the earliest .Data on spontaneous and indicated preterm neonate outcome is sparse.

Objective: To compare the neonatal outcome of spontaneous and indicated preterm births less than 37 weeks of gestational age in terms of respiratory morbidity , sepsis hyperbilirubinemia , hypoglycemia , and necrotizing enterocolitis during hospital stay

Study design: Prospective study of the two groups ,Spontaneous preterm neonates and Indicated preterm neonates .

Study population : All Inborn babies as well as Outborn babies admitted at PSG hospital within 24 hours of life who are singleton live births less than 37weeks of gestational age during the study period from September 2014 to February 2015 .

Results : Of 11.4 % of preterm deliveries (142 out of 1242 deliveries), 60 % (78) were spontaneous while 40 % (52) were indicated preterm births with increased incidence of hypoglycemia in indicated preterm infants(P 0.012) . There was no statistically significant difference among the two groups , spontaneous and indicated preterm infants in terms of respiratory morbidity(28.2 % vs 33%, P 0.58) , hyperbilirubinaemia (68% vs 60% ,P 0.33),sepsis (11.5 % vs 19.2% ,P 0.22) , necrotising enterocolitis (3.8 % vs 0% , P0.15).

Conclusion : Indicated preterm infants are at increased risk of hypoglycemia when compared to spontaneous preterm neonates and there is no significant difference in neonatal outcome among spontaneous and indicated preterm infants in terms of respiratory morbidity , hyperbilirubinaemia ,sepsis , necrotising enterocolitis.Larger studies are recommended for detailed understanding of the spontaneous preterm births and sub groups of indicated preterm births based on maternal and fetal indications .

Key words : spontaneous preterm neonates ,indicated preterm neonates , respiratory morbidity , hyperbilirubinaemia , hypoglycaemia ,sepsis , necrotising enterocolitis.

INTRODUCTION

Preterm birth is rising in magnitude globally and it is a leading cause for neonatal morbidity and mortality. Hence preterm birth is a major health problem. Though perinatal mortality rate is in decreasing trend due to improvement in health care systems and timely obstetric intervention, the rate of preterm delivery is increasing in proportion contributing to the global economic burden . Hence there is a necessity for detailed understanding of the causes that lead to preterm birth and neonatal morbidity . Preterm birth results either following spontaneous preterm labour with or without preterm premature rupture of membranes or following induction of labour /prelabour caesarean delivery when the risk of continuing pregnancy threatens the life of mother or fetus . Hence study on outcome of preterm neonates based on clinical categorization into spontaneous and indicated preterm group provides knowledge about the morbidity pattern in each clinical subtype and to decide on medical intervention at the earliest .

Indian data on spontaneous and indicated preterm birth is sparse. Most available studies are on late preterm births and retrospective in nature .Hence this prospective study is done to compare neonatal outcome of spontaneous and indicated preterm birth .

REVIEW OF LITERATURE

The term ‘ Preterm neonate ‘ refers to a baby born before 37 weeks of gestational age or 259 days following last menstrual period .

INCIDENCE :[1]

Preterm birth rate refers to live births born before completion of 37 weeks (including multiple and singleton) per 100 live births .Globally about 15 million babies are born preterm each year . Among them , India is a major contributor with about 3.6 million preterm born every year thus accounting for 24 % of preterm birth

MORTALITY :

Prematurity is global health problem as it is a second leading cause of death among children under 5 years of age. About 1 million children die annually as result of complications due to preterm birth . Infant mortality rate in India was 46 / 1000 live births in 2010 and has decreased to 41 / 1000 live births .

- Study by Van der Ven AJ et al shows that at Netherlands, among singleton pregnancies, the incidence of preterm deliveries is 6.0% [2]

- Study by Villar et al Small for gestational age neonates was highest among the medically indicated preterm delivery group (22.3%) and the incidence of preterm deliveries to be 8.6% [3]
- Study by Ananth CV et al states that preterm birth complicates 12.5% of all deliveries in the USA and prematurity is the major cause for perinatal morbidity and mortality by accounting for 75% perinatal deaths .[4]

ETIOLOGY OF PRETERM BIRTH : [5]

1.Preterm labour

2.preterm premature rupture of membranes

3.Intra uterine Infection

5.chorioamnionitis

5. antepartum hemorrhage –abruptio placenta , placenta previa

6.. multiple gestation

7..fetal anomalies

8. Acute or chronic maternal illness

9. previous preterm delivery

10. previous abortions

11. short stature

12. low socio economic status (Kuppuswamy socioeconomic scale IV and V)

13. Maternal weight < 50 kg

14 .obesity

15. Genetic influence

16. Maternal stress

17. Incorrect estimation of gestational age

18. Extreme maternal ages (< 18 years or > 35 years)

19. polyhydramnios /oligohydramnios

20. uterine anomalies

- In the study by Uma S et al [6] PPROM contributes for 25.9 % of the preterm delivery, maternal illness results in 22.1 % of preterm delivery previous abortions and previous preterm delivery contributes 14.4 % for subsequent preterm deliveries
- In the study by Goldenberg RL et al [7] intrauterine infection acquired by haematogenous or ascending or retrograde spread account for 25–40% of preterm births.
- In the study by Engel Sa et al [8] and Crider KS et al [9] genetic association contributing for preterm labour and PPROM has been studied by identification of single nucleotide polymorphisms in several genes .
- In the study by Wadhwa PD et al [10] maternal stress is found to promotes premature delivery by activation of maternal –placental –fetal neuro endocrine pathway .

CO MORBIDITIES OF PRETERM BIRTH :

Prematurity of infant results in the following immediate and long term morbidities.[11]

Short term comorbities of preterm birth :

A) Respiratory system :

1.Perinatal depression

2. Apnea of prematurity

3. Respiratory distress syndrome

4. bronchopulmonary dysplasia / chronic lung disease

B)Cardiovascular system :

1. Patent ductus arteriosus

2 .cardiac dysfunction

C) Nervous system :

1. Perinatal depression

2. Intracranial hemorrhage

D) Gastrointestinal system :

Necrotising enterocolitis

E) Haematologic :

1. Anaemia of prematurity

2. hyperbilirubinaemia / kernicterus

F) Nutritional :

Feeding difficulties : immature suck –swallow reflex

G) Metabolic :

Disorders in Calcium and glucose metabolism

H) Renal system :

Fluid and electrolyte disequilibrium

I)Temperature instability :

Hypothermia / hyperthermia

J)Immunologic immaturity :

Deficient Humoral and cellular responses

Long term co morbities of preterm birth :

1. Developmental disability

- Cerebral palsy
- Mental retardation

2. Behavioral disorders

- learning disability
- hyperactivity
- Attention deficit

3. Hearing impairment

4. visual disability

5. Retinopathy of prematurity

6. Chronic lung disease - long term bronchodilator and steroid treatment

7. Recurrent Hospitalization for increased rates of illness

8. Poor growth velocity

Weight , Lengths, Head circumference for age of preterm infants are less compared to term infants [12]

CATEGORISATION OF PRETERM INFANTS

Preterm infants are sub categorized on the basis of gestational age [13] as

	Gestational age	percentage
extreme prematurity	< 28 weeks	5%
severe prematurity	28–31weeks	15%
moderate pre maturity	32- 33 weeks	20%
Near term	34–36 weeks	60–70%

CLINICAL CATEGORISATION OF PRETERM INFANTS

Preterm births are categorized based on Clinical presentation into spontaneous preterm and indicated preterm births.[14 -16]

The term ‘ Spontaneous ‘ preterm births refers to births resulting from preterm labour and preterm premature rupture of membranes (PPROM) as incase of infection , inflammation , uterine over distension , cervical incompetence . [15,17]

PPROM is defined as spontaneous rupture of the membranes at less than 37 weeks gestation at least 1 h before the onset of contractions . Asymptomatic intrauterine infection is a frequent precursor.

Preterm labour is usually defined as regular contractions accompanied by cervical change at less than 37 weeks gestation. [4]

The term ‘ Indicated preterm births ‘refers to births warranting induction of labour or prelabour caesarean birth in a condition where further continuation of pregnancy places the health of mother / fetus at risk as in case of maternal disorders such as hypertension, preeclampsia, liver disease, and diabetes or Fetal complications such as fetal distress ,intra uterine growth restriction , placenta previa ,abruptio placenta (ischaemic placental disease) ,oligohydramnios.[15]

- Study by Romero R etal states that occult intrauterine infection leads to inflammatory decidual activation resulting in premature initiation of labour .[17]
- Study by Norman et al [18]stated that spontaneous preterm birth rate was rising to 10.73 % but indicated preterm birthrate rising at higher rate of about 41.47 %
- Spontaneous preterm delivery is more common in undernourished thin women because of increased chances of maternal infection [19, 20]
- In the study by Ananth CV et al [21] the common indications requiring medical intervention that results in preterm birth < 35 weeks were preeclampsia, fetal distress,SGA and placental abruption.

- Study by Ananth CV et al [4]states that Among the clinical subtypes of preterm birth , there is a decrease in perinatal mortality in indicated preterm group (40 % of the preterm) due to obstetric intervention at earlier gestational age though rate of indicated preterm delivery is in rising trend .
- Indicated preterm birth more likely to occur in obese women due to as they have increased risk of preeclampsia and diabetes .[22]

Though prematurity in itself can result in adverse neonatal outcomes , clinical subtype spontaneous or indicated also has an impact on neonatal morbidity and mortality. Hence the risks associated with further continuation of pregnancy and the risks that result from prematurity should be evaluated and appropriate decision has to be made to reduce neonatal morbidity and mortality.

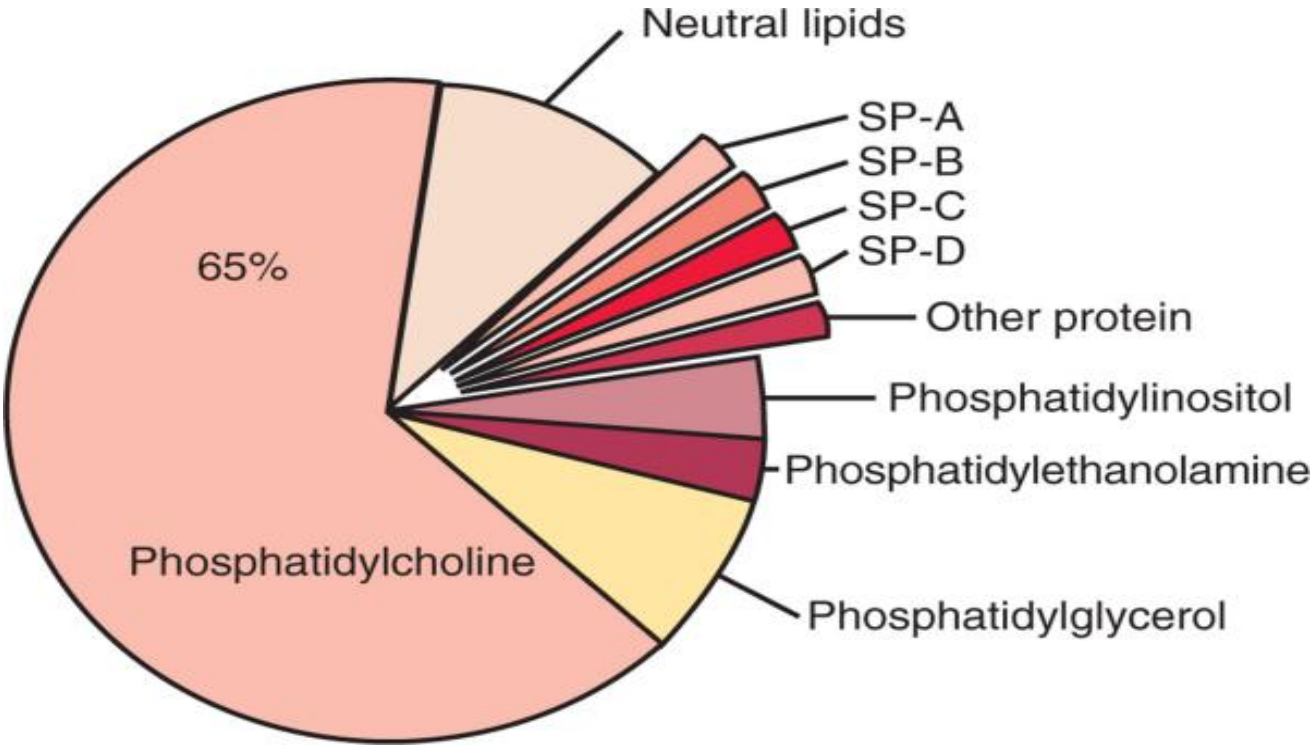
RESPIRATORY MORBIDITY:

Preterm neonates are more prone for respiratory morbidity with higher incidence of repiratory distress syndrome due immaturity of lung and surfactant deficiency , Apnea of prematurity , transient tachypnea of newborn .

RESPIRATORY DISTRESS SYNDROME

RDS otherwise known as Hyaline membrane disease results from deficiency of surfactant in the lungs that leads to alveolar collapse.

SURFACTANT COMPOSITION



Surfactant synthesized by type 2 alveolar cells from 20 weeks of gestation is primarily composed of phospholipids rich in dipolmitoyl acyl group that reduces alveolar surface pressure . Antenatal administration of 2 doses of 12mg betamethasone intramuscular steroid to mother is more effective in preventing respiratory distress syndrome in preterm babies .

- Study by kambafwile et al [23]showed that respiratory distress syndrome and surfactant deficiency in immature lung of preterm infants is the leading cause of preterm neonatal mortality .Administration of antenatal steroids has shown decrease in neonatal mortality by 53% and neonatal morbidity by 37 % in preterm infants less than 36 weeks of gestational age . The recent Cochrane review showed that antenatal steroids reduce preterm neonatal mortality by 31% and reduction of respiratory morbidity by 34% . [23]

Early administration of surfactant and CPAP support to preterm neonates with RDS reduces the need of ventilator support .

Prenatal assessment of fetal lung maturity by Amniocentesis :

1. Lamellar body counts
2. Lecithin/sphingomyelin ratio
3. Foam stability index
4. TDx-FLM II: Surfactant to albumin ratio is measured
5. Presence of phosphatidyl glycerol

Clinical features :

- Grunting , increased respiratory rate
- Chest intercostal and subcostal retractions

Chest x ray findings include reduction in lung volume and reticulogranular pattern of lung fields

Management :

Surfactant therapy

Continuous positive airway pressure

Mechanical ventilation

APNEA OF PREMATURITY :

Apnea refers to absence of airflow by cessation of respiration for more than 20 seconds associated with heart rate less than 100 beats per minute (bradycardia)

and hypoxemia as detected by cyanosis or low spo2 .

It is estimated that all infants below 28 weeks have apnea and incidence is inversely proportional to gestational age .

Apnea is more common in preterm neonates because of

1.Immature central respiratory drive

2. Immature peripheral chemoreceptor response to increased CO2 levels

3. Airway obstruction

4.Gastroesophageal reflex

Neonate with apnea should be Evaluated for :

1. Infection

2. Metabolic disorders

3. Temperature instability

Treatment :

1.Proper positioning

2.Nasal CPAP

3. Correction of anemia by blood transfusion

4. Treatment with caffeine

5. Mechanical ventilation

TRANSIENT TACHYPNOEA OF NEWBORN

TTNB is a benign morbidity that results due to delay in reabsorption of fluid in the interstitium and interlobar fissures into lymphatics and pulmonary capillaries following birth . It accounts for about 40-45% of respiratory morbidity in newborns. newborn. Risk factors for TTNB would be higher in neonates born by caesarean delivery where there is no hormonal mileau compared to spontaneous delivery .

Clinical features:

- Tachypnea occurs usually for 6 hours ,occasionally lasting for 24-72 hours.
- grunting , Chest retractions,
- Auscultation shows crepts
- Fio 2 requirement less than 40 %

Investigations :

CHEST X RAY : Prominent perihilar streaking

Arterial blood gas analysis shows mild respiratory acidosis

Treatment:

Supplemental oxygen

Continuous positive airway pressure

- Retrospective study by Nkyekyer et al[24] showed preterm birth rate to be 9.3 % . Among them 61% were spontaneous preterm infants and 39 % were indicated preterm infants .Perinatal mortality was higher and significant longer NICU care was required among survivors of indicated preterm births .
- Retrospective cohort study by Lee JH et al [25] on 243 preterm neonates of 24-32 weeks gestational age showed 47 % incidence of respiratory distress .Among them 58.1 % were indicated preterm and 38.4 %were spontaneous preterm .Hence spontaneous preterms had survival advantage on comparing with indicated preterm irrespective of the mode of delivery.
- Retrospective study by Yang LC et al [26] on spontaneous preterm of 16 – 26 weeks gestational age due to PPROM showed that 38 out 73 infants survived .All the survivors had respiratory distress with incidence of was 100% .

- Shimoya et al [27] reported that chorioamnionitis induces fetal lung maturation by increasing interleukin-6 and reduces the incidence of RDS. In this study, neonates born after spontaneous preterm birth had significantly higher rate of histological chorioamnionitis compared to the indicated pretermbirth group (59.9% vs. 9.3%; p<.001) Study by Roth-Kleiner M et al [28] has shown that , in late preterm infants respiratory morbidity was higher among those preterm neonates delivered by elective caesarean section when compared to caesarean section after labour.
- Study by Feldman K et al [29]reported that indicated late preterm infants born following Caesarean without labour were at increased risk of needing resuscitation (OR 2.43) and of developing Transient tachypnea of new born (OR 1.43) , Respiratory distress syndrome(OR 2.33)apneic spells (OR 1.29) on comparison with spontaneous preterm .

NEONATAL HYPERBILIRUBINEMIA :

Jaundice is the most common morbidity in the first week of life and it occurs in 80% of preterm newborn. Jaundice is the most common cause of readmission after discharge from birth hospitalization. [30]

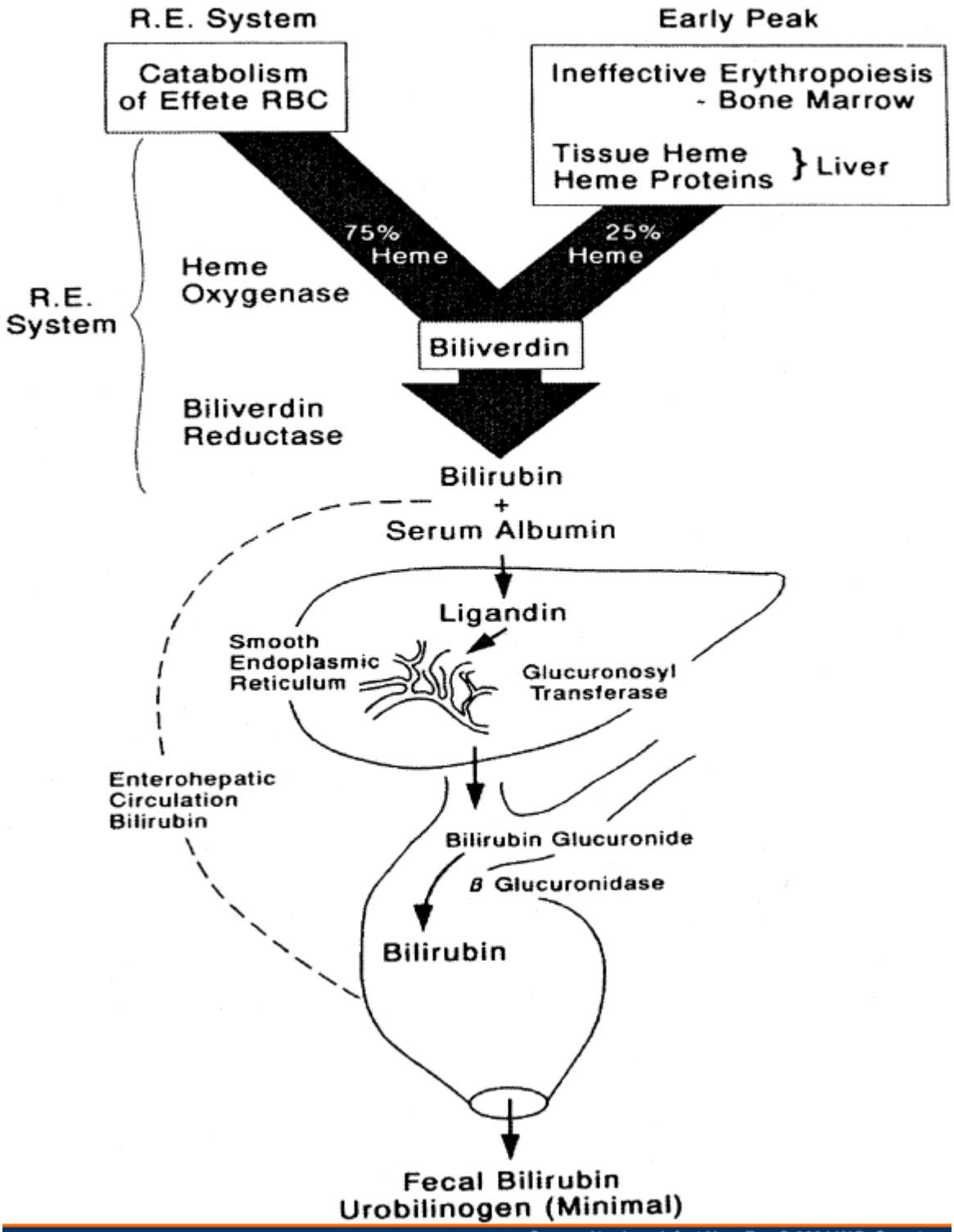
Increase in neonatal serum bilirubin levels results from 3 factors namely

1.increased degradation of red cells

2. decreased clearance by immature hepatic mechanisms

3. Reabsoption by enterohepatic circulation

Bilirubin Metabolism



Source: Newborn Infant Nurs Rev © 2004 W.B. Saunders

- Study by Radha k et al [31] reported that clinical examination had sensitivity of 52.2% in detecting hyperbilirubinemia with total serum bilirubin more than 13mg% .

Physiological jaundice :

It results from physiological immaturity of the mechanisms required for handling the increased bilirubin production and it appears after 24 to 72hours of age .

Pathological jaundice :

1.Visible jaundice (TSB more than 5 mg/dL) in 24 hours of life .

2. Presence of jaundice on arms and legs on day 2

3. Yellow palms and soles anytime

4. Serum bilirubin concentration more than 95th centile as per age-specific bilirubin nomogram

5. Signs of acute bilirubin encephalopathy or kernicterus (hypertonia, retrocollis, convulsion, fever)

7. Direct bilirubin more than 1.5 to 2 mg/dL at any age

8. Clinical jaundice persisting beyond 3 weeks in preterm neonates

Etiology of pathological jaundice :

1. Hemolysis :

- ABO, Rh and minor groups incompatibility
- G6PD enzyme deficiency
- Autoimmune hemolytic anemia

2. Decreased conjugation such as prematurity

3. Increased enterohepatic circulation such as lack of adequate enteral feeding or gastric obstruction or illness

4. Extravasated blood

- cephalhematoma,
- extensive bruising

EVALUATION OF JAUNDICE :

1.Neonate should be visually inspected in bright natural / white light every 12 hr during initial 3 to 5 days of life.

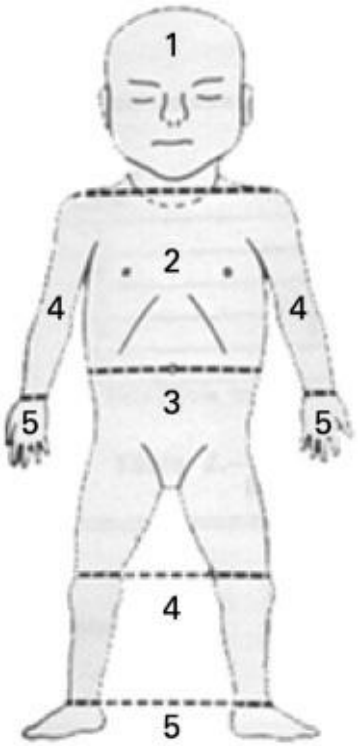
2. sites to be examined are gums, and sclerae blanched skin

3. The extent of jaundice should be noted

4. *Depth of jaundice / degree of yellowness should be noted* as it is an important indicator of level of jaundice *even in absence of yellow soles or palms* .

KRAMER'S RULE

EXTENT OF JAUNDICE	TOTAL SERUM BILIRUBIN
Face	5- 7 mg/dL
Chest	8-10 mg/dL
Lower abdomen/thigh	12 -15 mg/dL
Soles/Palms	>15 mg/dL



Grade	Extent of jaundice
0	None
1	Face and neck only
2	Chest and back
3	Abdomen below umbilicus to knees
4	Arms and legs below knees
5	Hands and feet

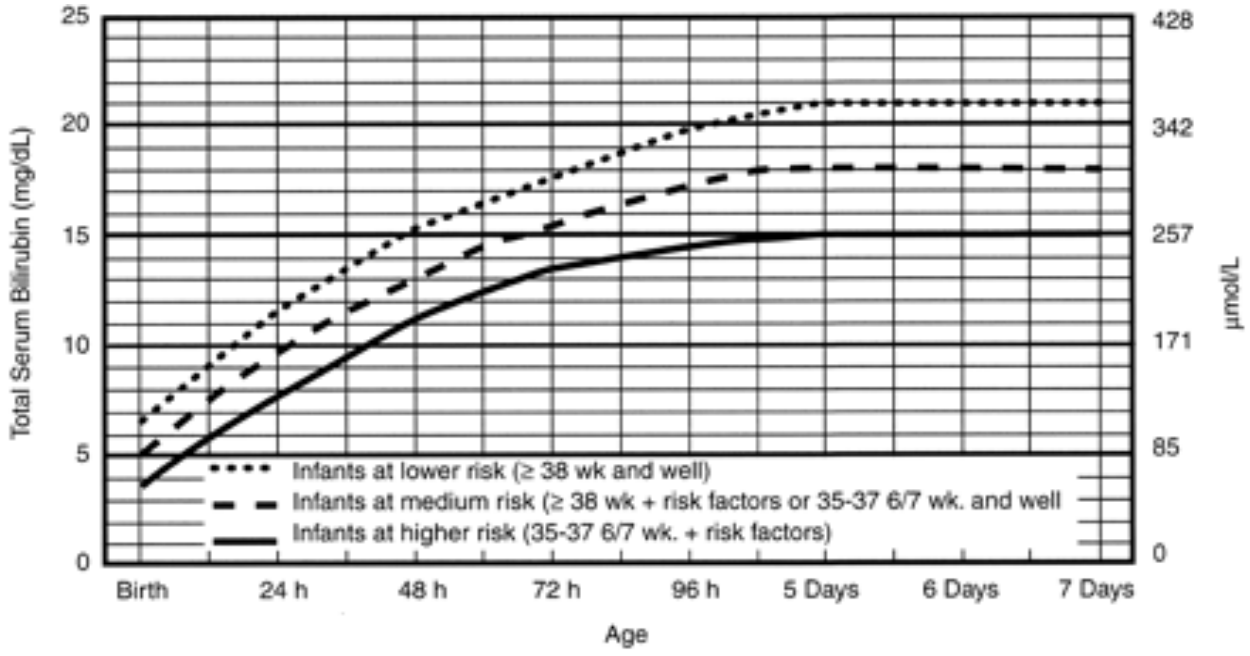
Measurement of serum bilirubin

Trans cutaneous bilirubin can be used in infants of 35 weeks or more of gestation after 24 hours of age as an adjunct to serum bilirubin measurement .

Phototherapy and exchange transfusion cut-offs for preterm babies [32]

	Total serum bilirubin (mg/dL)			
Birth weight	**Healthy baby**		**Sick baby**	
	Phototherapy	Exchange transfusion	Phototherapy	Exchange transfusion
<1000 gm	5-7	11-13	4-6	10-12
1001-1500 gm	7-10	13-15	6-8	11-13
1501-2000 gm	10-12	15-18	8-10	13-15
2001-2500 gm	12-15	18-20	10-12	15-18

AAP nomogram for phototherapy in hospitalized infants of 35 or more weeks' gestation. [33]

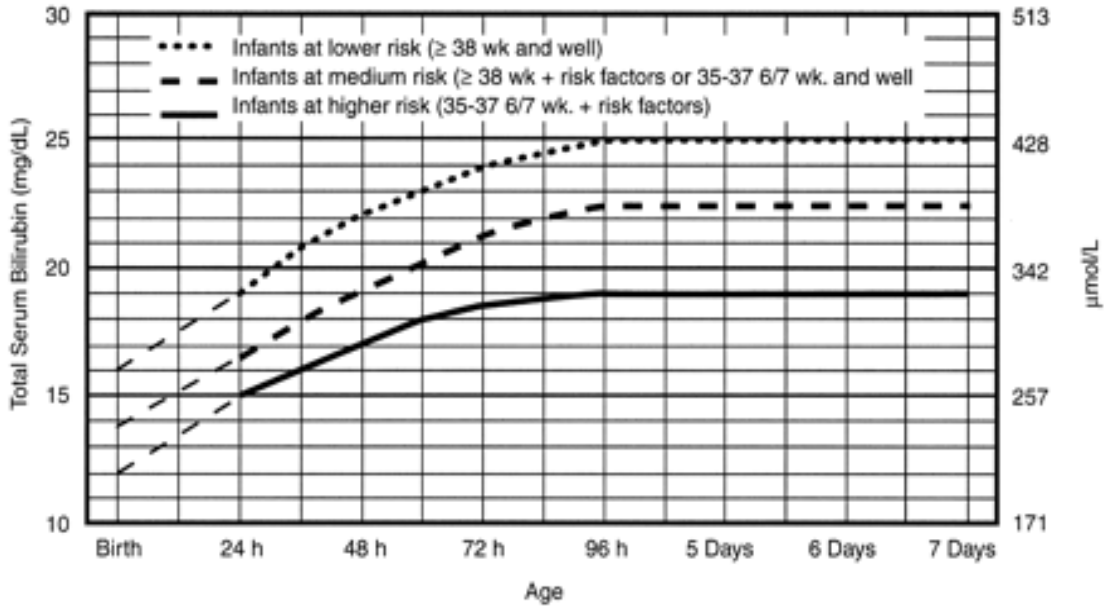


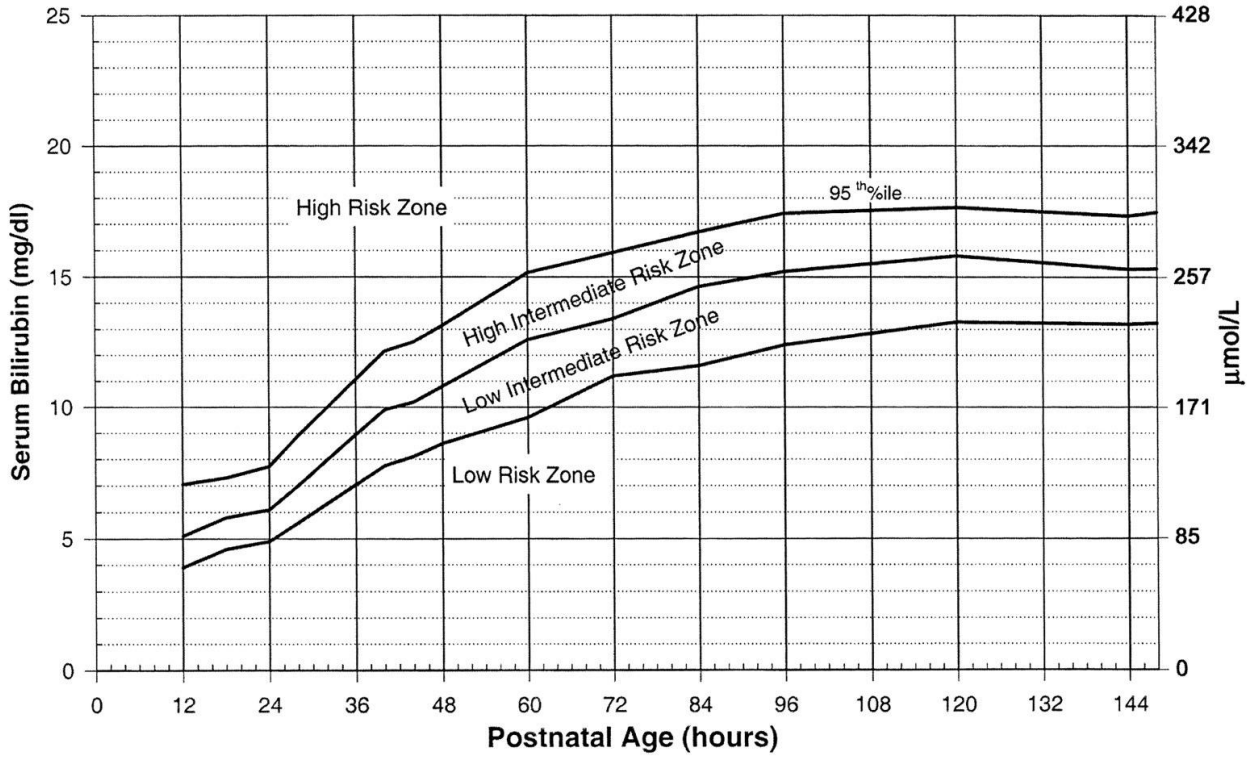
(**Risk factors :**

Isoimmune hemolytic anemia, hypoalbuminaemia, asphyxia, temperature instability, hypothermia, temperature instability , significant lethargy, G6PD deficiency ,acidosis and sepsis)

AAP nomogram for exchange transfusion in infants 35 or more weeks' gestation

33





Phototherapy :

It converts insoluble bilirubin (unconjugated) into soluble isomers that can be excreted in urine and feces.

Administering phototherapy

Phototherapy is given under ambient room temperature to maintain euthermia exposing maximal body surface area .

Monitoring & stopping phototherapy

- Monitor temperature of the baby every 2 to 4 hr.
- Measure TSB level every 12 to 24 hours.
- Discontinue phototherapy once two TSB values 12 hr apart fall below current age specific cut offs.

Double volume exchange transfusion should be performed if the TSB levels reach to age specific cut-off for exchange transfusion or the infant shows signs of bilirubin encephalopathy irrespective of TSB levels.

- Study by Uma S et al [6] reported that 50% of spontaneous preterm babies irrespective of the gestational age have jaundice .
- Study by Sehgal A et al [34] neonatal hyperbilirubinemia is common cause of preterm morbidity accounting for 78% of extremely low birth weight babies .

- Study by Melamed et al [35] reported that among spontaneous late preterm neonates 18% had jaundice requiring phototherapy compared to 2.5 % in term newborns .
- Study by Feldman K et al [29] reported that indicated late preterm infants born following induced labour were at increased risk of hyperbilirubinaemia with Odds Ratio 1.14; 95% CI 1.03 to 1.27 , on comparison with spontaneous labour .

Timing of Follow-up [33]

Time of discharge	Review
Before 24 hours	72 hours
Between 24 and 47.9 hours	96 hours
Between 48 hours and 72 hours	120 hours

End Tidal Carbon monoxide levels : [36]

Haem metabolism results in bilirubin and carbon monoxide production .

End Tidal Carbon monoxide level measurement aids in assessment of hemolysis ,but this test is not suitable for practice when compared to serum bilirubin estimation

Preterms were found to have less number of albumin binding sites compared to the term infants. [37]

HYPOGLYCAEMIA

As per WHO , Blood glucose levels below 40 mg / dl is considered to be hypoglycemia . There is no universal definition for hypoglycemia due to lack of evidence for the specific levels of low blood glucose concentration that can result in acute or chronic irreversible neurological damage .

Cornblath's operational threshold for hypoglycemia : [38]

Hypoglycaemia is defined as that concentration Blood glucose levels below 40 mg / dl or plasma glucose level below 45 mg/dl at which clinician should consider intervention .

Whipple triad suggestive of neonatal hypoglycemia :

1. low blood glucose concentration
2. signs consistent with neonatal hypoglycemia such as jitteriness, temperature instability ,difficulty in feeding ,lethargy , apnea, convulsions ,cyanosis
3. Resolution of signs and symptoms after restoring blood glucose concentrations to normal values.

SCREENING FOR HYPOGLYCEMIA : [39]

1.Preterm infants

2. Low birth weight infants (< 2000g)

3.Small for Gestational Age (birth weight < 10 th percentile)

4. Intra uterine growth restriction

5. Infants on total parenteral nutrition

6. Infant of diabetic mother

7.Infants with Rh hemolytic disease

8.. Large for gestational age (birth weight > 90 th percentile)

9. Sick neonate with perinatal asphyxia , polycythemia sepsis,

10. mother on tocolytics , oral hypoglycemic drugs , insulin ,Propranalol

Glucose homeostasis is maintained by insulin ,glucagon and other counter regulatory hormones . Preterm infants are at higher risk for hypoglycemia due to inadequate substrate supply from immature hepatic enzymes for gluconeogenesis and glycogenolysis . Four major pathway for adoption are 1)hepatic gluconeogenesis , 2) gluconeolysis ,3)fatty acid oxidation and 4)ketogenesis.

The term ‘ physiologic hypoglycemia ‘ is a transient form of neonatal hypoglycemia occurring in normal neonates during initial 1-2 hours after birth and glucose levels normalize after 3- 4hours of birth by alternative metabolism. [40]

Blood glucose monitoring :

1. At risk neonates should be screened at 2,6, 12,24 , 48, 72 hours

2. sick infants screened every 6-8 hours

3. stable VLBW infants screened every 6 to 8 hourly for initial 72 hours of life and once daily from day 4 of life .

Study by Hume R et al [41] found that small for gestational age and preterm babies are prone for hypoglycemic episodes till 36 hours of age hence these neonates have to be monitored for hypoglycemic episodes till 36 hours of life .

- Study by Riity MK et al [12]showed that Among singleton birth of 24 -33 weeks gestational age , 79% of indicated preterm neonates had hypoglycemia compared to 49 % of spontaneous preterm which was of statistical significance .
- Study by Melamed et al [35] reported that among spontaneous late preterm neonates about 6.8% had hypoglycemia compared to 0.4 % in term newborns which was statistically significant.
- Study by Feldman K et al [29]reported that indicated late preterm infants born following Caesarean section without labour were at increased risk of hypoglycemia with Odds Ratio 1.97; 95% CI 1.63 to 2.39 on comparison with spontaneous labour .

SEPSIS

Neonatal sepsis refers to clinical syndrome of signs and symptoms of infection with or without bacteremia in the first 28 days of life including systemic infection such as septicemia, arthritis, osteomyelitis ,meningitis, urinary tract infections and pneumonia.

Sepsis is the preventable and most common cause of neonatal mortality accounting for 30-50% of the neonatal deaths in developing countries.

The incidence of neonatal sepsis as per the data from National Neonatal Perinatal Database (NNPD, 2002-03) is 30 per 1000 live births. Klebsiella pneumoniae was the most frequently isolated pathogen (32.5%), followed by Staphylococcus aureus (13.6%).

- Study by Martono [42] reported that administration of antenatal steroid delays preterm spontaneous delivery due to PPROM but increases the risk for infection .Incidence of preterm neonatal sepsis is 1 per 250 live preterm birth .
- In a study by CDC surveillance [43] Group B Streptococci late onset sepsis was prevalent in preterm neonates particularly around gestational age of 30 weeks .

Early onset sepsis (EOS):

EOS presents within the first 72 hours of life as respiratory distress or pneumonia. The source of sepsis is maternal genital tract.

Risk factors for EOS based on Indian studies : [42]

1. Prematurity

2. Low birth weight (<2500 grams)

3. Maternal fever within 2 weeks prior to delivery

4. Membranes rupture > 18 hours

5. Single unclean or > 3 sterile vaginal examination(s) during labor

6. Prolonged labor (I and II stage of labor > 24 hrs)

7. Perinatal asphyxia (Apgar score <4 at 1 minute)

8. Foul smelling or meconium stained liquor

Infants with two risk factors should be investigated and then treated accordingly.

Late onset sepsis (LOS):

LOS presents after 72 hours of age as septicemia, pneumonia or meningitis.

The source of infection is either hospital-acquired or community-acquired

Risk factors for LOS :

1.NICU admission – invasive procedures

2.low birth weight

3. prematurity

4. poor hygiene - poor cord care, prelacteal feeds.

Clinical presentation of sepsis :

1.Temperature instability

2. Decreased cry and activity

3. Hypoglycemia / hyperglycemia

4. Gastrointestinal system : Feed intolerance , necrotizing enterocolitis

5. Respiratory system : Respiratory distress, apnea

6. Cardiac vascular system : Hypotensive shock

7.Central nervous system : Irritability , seizures, meningitis

8. Hematological: Bleeding tendency

9.Renal: Acute renal failure

10. Dermatological changes: Multiple pustules, sclerema, mottling.

Septic screen: [44 , 45]

Newborns suspected to have sepsis should be evaluated with septic screen which include

1.Total leukocyte count (TLC)

2. Absolute neutrophil count (ANC)

3.Immature to total (IT) neutrophil ratio

4. C reactive protein (CRP)

5.Micro-erythrocyte sedimentation rate

Two abnormal parameters in sepsis screen has specificity of 83 % and sensitivity of 93 – 100% in detection of sepsis .Based on positive sepsis screen decision can be made to start antibiotics.

CDC [46] recommend diagnostic evaluation, including blood and cerebrospinal fluid cultures, and treatment with broad-spectrum antibiotics for infants who show clinical signs of sepsis .

Blood culture:

Blood culture is the gold standard test for diagnosis of septicemia and to decide antimicrobial therapy based on sensitivity pattern . Early detection of bacterial growth within 12- 24 hours is feasible by BACTEC or BACT /ALERT blood culture systems .

Lumbar puncture :

Lumbar puncture for CSF analysis should be done in a neonate with culture proven sepsis to rule out meningitis as clinical features of septicemia and meningitis often overlaps .

The incidence of meningitis in neonatal sepsis was estimated to be 0.3 – 3 % in various studies.

Normal cerebrospinal fluid examination in preterm neonates [11]

CSF Components	**Normal range**
Cells/mm3	9(0-29 cells)
PMN (%)	57 %
CSF protein (mg/dL)	115 (65 - 150)
CSF glucose (mg/dL)	50(24 -63)
CSF/ blood glucose (%)	74 (55 -105)

Radiology:

Chest X-ray should be done in neonate with respiratory distress and Xray abdomen should be in neonates with suspicion of necrotizing enterocolitis

Neuroimaging is indicated in neonates with meningitis.

Urine culture:

Urine culture is indicated in neonates with urogenital anomalies and in neonatal sepsis to exclude urinary tract infection .

Urinary tract infection is diagnosed in neonate if more than 10 WBC /mm3 is present in centrifuged sample or catheterized urine sample shows more than 10,000 organisms /ml or any organism detected in urine sampled by supra pubic aspiration.

- Study by NICHD [47] found in low birth weight neonates with cultureproven meningitis ,blood cultures were negative 34% (45/134) .

- Study by William EB et al [48] reported that antimicrobial therapy should be initiated immediately in preterm neonates less than 34 weeks gestation or1500 g with severe clinical signs and risk factors of early onset sepsis after sampling for culture whereas in preterm neonates with mild clinical signs of sepsis , initiation of antibiotics should be decided after 6 hours of observation for resolution of features of sepsis serial laboratory evaluation .
- Natale et al[49] reported the 70 % incidence of sepsis in late preterm infants .
- Mc Intire et al. [50] reported an incidence of culture proven sepsis from 2 to 5 times higher in late preterm infants .80 % of late preterm delivery results from Preterm labor and preterm premature ruptureof membranes and hence this major proportion of spontaneous preterm are at risk for EOS warranting evaluation for sepsis and antimicrobial therapy .
- Study by Robert JS et al [51]reported that indicated preterm are at higher risk for Group B streptococcal sepsis .
- Lamont RF [52] reported that 40 % of preterm births resulted from spontaneous preterm labour associated with infection and stated that preterm labour resulting infection is refractory to tocolytic agents.

NECROTISING ENTEROCOLITIS

Necrotising enterocolitis is a devastating condition of the preterm neonates characterized by bowel necrosis and multisystem organ failure that leads to perforation of the bowel and sepsis by translocation of gut colonizing nosocomial pathogens into blood. [53,54]

NEC affects 10 % of extremely preterm (< 28 weeks) or extremely low birth weight (<1000 g) infants and 5% of very preterm (28 – 31 weeks)or very low birth weight infants (<1500 g) .It has been reported that NEC associated mortality is about 10 % and about 25 % of infants with NEC require surgical intervention. [55]

Risk Factors for NEC [56- 59]

(1) Prematurity (<28 weeks).

(2) Enteral feed

(3) Intra uterine growth restriction

(4) Maternal hypertensive disease of pregnancy

(5) Placental abruption.

(6) Packed cell transfusions.

(7) Absent or reversed end diastolic flow velocity

(8) Use of umbilical catheters

(9) Low Apgar scores

Susceptibility of preterm infants to NEC : [60]

(1) Mechanical factors (barrier integrity):

- incresed permeability of gut
- decreased peristalsis,
- mucus layer deficiency,

(2) Bacterial factors - altered gut microbiota

(3) decreased gastric acid and bile acid production,

(4) decreased lactase levels

- Nanthakumar NN et al [61] stated that preterm infants have higher concentration of inflammatory mediators that contributes to NEC compared to term infants .
- Crowley P et al[62] reported that antenatal corticosteroid administration is associated with a reduction in the incidence of RDS and IVH thus lowers the risk of NEC.
- Been et al [63] reported that chorioamnionitis increases the risk for NEC.
- Retrospective study by Yang LC et al [26] on spontaneous preterm of 16 – 26 weeks gestational age due to PPROM showed that 38 out 73 infants survived .Among the survivors incidence of NEC was 5.3 % and respiratory distress was 100% .
- Study by Feldman K et al [29] reported that indicated late preterm infants born following Caesarean section without labour were at increased risk of NEC with Odds Ratio 3.20; 95% CI 1.07 to 9.53)on comparison with spontaneous preterm .

The modified bells staging of NEC for diagnosis and treatment

Stage	Systemic signs	Abdominal signs	Radiographic signs	Treatment
IA Suspected	Temperature instability, apnea, bradycardia, lethargy	Gastric retention, abdominal distention, emesis, heme-positive stool	Normal or intestinal dilation, mild ileus	NPO, antibiotics x 3 days
IB Suspected	Same as above	Grossly bloody stool	Same as above	Same as IA
IIA Definite, mildly ill	Same as above	Same as above, plus absent bowel sounds with or without abdominal tenderness	Intestinal dilation, ileus, pneumatosis intestinalis	NPO, antibiotics x 7 to 10 days
IIB Definite, moderately ill	Same as above, plus mild metabolic acidosis and thrombocytopenia	Same as above, plus absent bowel sounds, definite tenderness, with or without abdominal cellulitis or right lower quadrant mass	Same as IIA, plus ascites	NPO, antibiotics x 14 days
IIIA Advanced, severely ill, intact bowel	Same as IIB, plus hypotension, bradycardia, severe apnea, combined respiratory and metabolic acidosis, Disseminated Intravascular Coagulation (DIC), and neutropenia	Same as above, plus signs of peritonitis, marked tenderness, and abdominal distention	Same as IIA, plus ascites	NPO, antibiotics x 14 days, fluid resuscitation, inotropic support, ventilator therapy, paracentesis

AIMS AND OBJECTIVES

AIM OF THE STUDY :

To compare the neonatal outcome of spontaneous and indicated preterm births less than 37 weeks of gestational age .

PRIMARY OBJECTIVE :

To compare the proportion of respiratory morbidity among spontaneous and indicated preterm neonates less than 37 weeks of gestational age during hospital stay .

SECONDARY OBJECTIVE

To compare the spontaneous and indicated preterm neonates less than 37 weeks of gestational age in terms of hyperbilirubinemia , hypoglycemia , sepsis and necrotizing enterocolitis during hospital stay.

METHODS AND METHODOLOGY

STUDY DESIGN:

Prospective study of the two groups

- Group 1 : Spontaneous preterm neonates
- Group 2 : Indicated preterm neonates

PLACE :

PSG Institute of Medical Sciences & Research, Coimbatore

STUDY PERIOD :

From September 2014 to February 2015

STUDY POPULATION:

Singleton live preterm births less than 37weeks of gestational age born during the study period .

SAMPLE SIZE :

$$n = \frac{2pq\,(za + zb)^2}{(Pt - pc)^2} = \frac{2 \times 55 \times 45\ (1.96 + 0.84)}{30 \times 30} = \mathbf{43}$$

In terms of respiratory morbidity it is estimated that sample size should be a minimum of about 86 babies with atleast 43 babies in spontaneous preterm group and 43 babies in indicated preterm group.

Samples were collected for 6 consecutive months from September 2014 to February 2015

STUDY APPROVAL:

Ethics committee, PSG IMSR

INCLUSION CRITERIA :

All Inborn babies as well as Outborn babies admitted within 24 hours of life during the study period

- Singleton live births
- Less than 37weeks of gestational age

EXCLUSION CRITERIA:

- Major congenital anomalies
- Neonatal deaths immediately following delivery in spite of resuscitation
- Chromosomal anomalies .

METHODOLOGY

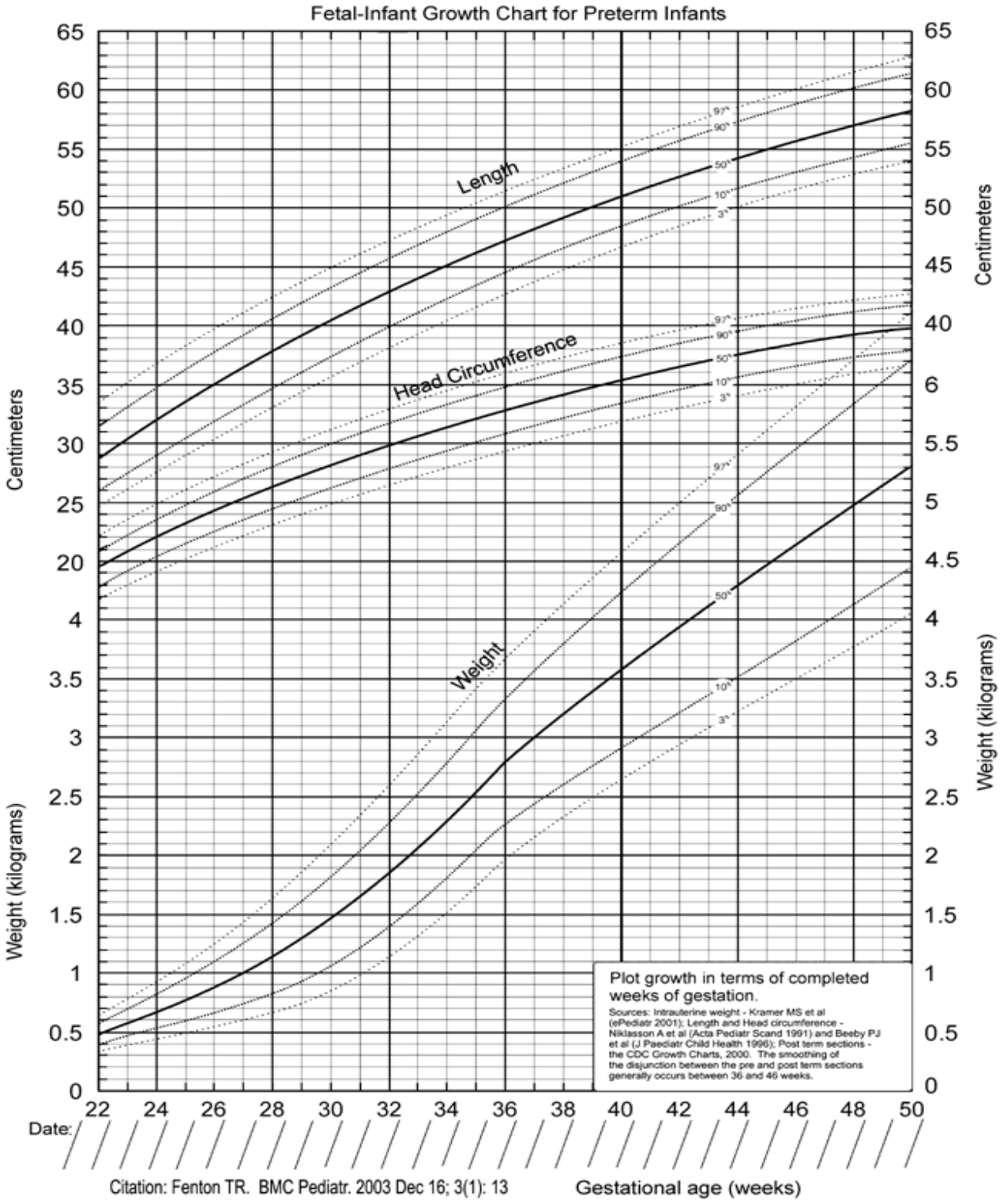
SELECTION AND ENROLLMENT OF STUDY PARTICIPANTS :

Singleton live neonates less than 37weeks of gestational age delivered at PSG hospital as well as Outborn neonates hospitalized within 24 hours of life have been included in the study .

Neonates with major congenital anomalies , chromosomal anomalies and those who died immediately after birth despite resuscitation are excluded from the study **.**

Informed consent is obtained on day one of life from parents of the preterm baby participating in the study after explaining the purpose and objectives of study.

The data such as Identification details of the baby , information about maternal risk factors , antenatal scan details , delivery details mentioned in the newborn case record are entered in a preformed data collection sheet **.** The preterm are categorized into spontaneous & indicated group . Baby‘s birth weight is plotted in Fenton’s chart and they are classified as AGA / SGA / LGA . Outcome of the baby during hospital stay in terms of respiratory morbidity , neonatal hyperbilirubinaemia requiring intervention , hypoglycemia , sepsis and necrotizing enterocolitis is assessed .


Fetal-Infant Growth Chart for Preterm Infants
Length
Head Circumference
Weight
97th
90th
50th
10th
3rd
Centimeters
Weight (kilograms)
Plot growth in terms of completed weeks of gestation.
Sources: Intrauterine weight - Kramer MS et al (ePediatr 2001); Length and Head circumference - Niklasson A et al (Acta Pediatr Scand 1991) and Beeby PJ et al (J Paediatr Child Health 1996); Post term sections - the CDC Growth Charts, 2000. The smoothing of the disjunction between the pre and post term sections generally occurs between 36 and 46 weeks.
Date:
Citation: Fenton TR. BMC Pediatr. 2003 Dec 16; 3(1): 13
Gestational age (weeks)

DESCRIPTION OF THE VARIABLES

Variables considered are

1. Respiratory morbidity

2. Neonatal hyperbilirubinemia

3. Hypoglycemia

4. Sepsis

5. Necrotising enterocolitis

1. RESPIRATORY MORBIDITY:

Neonate is considered to have respiratory morbidity if there was

- need for resuscitation at time of birth
- surfactant administration
- respiratory distress as manifested by grunting , tachypnea with respiratory rate more than 60 per minute, chest retraction with abnormal chest xray findings.
- Supplemental Oxygen requirement through nasal cannula
- Ventilator support in the form of CPAP or Mechanical ventilation
- Medication requirement such as Caffeine citrate

2. NEONATAL HYPERBILIRUBINEMIA:

Neonate with jaundice on visual inspection was investigated by serum bilirubin levels

.

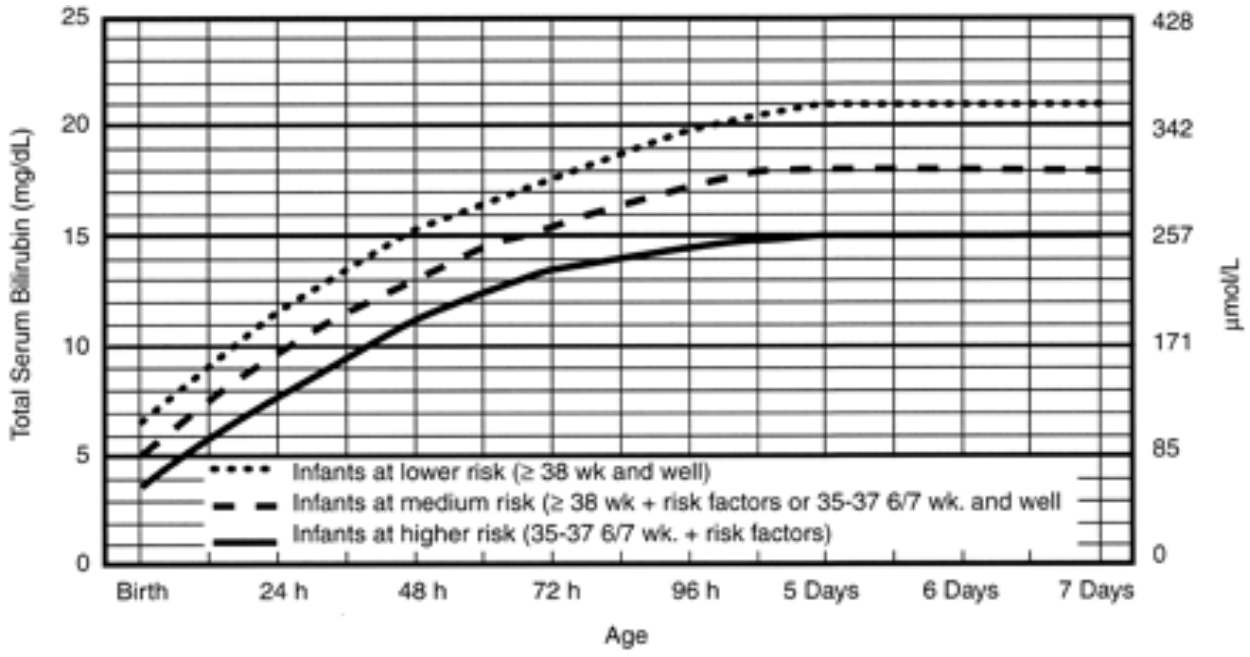
Serum bilirubin level is measured by Diazo method .

Intervention for jaundice was decided as per the following charts:

<u>Phototherapy and exchange transfusion cut-offs for preterm babies</u>

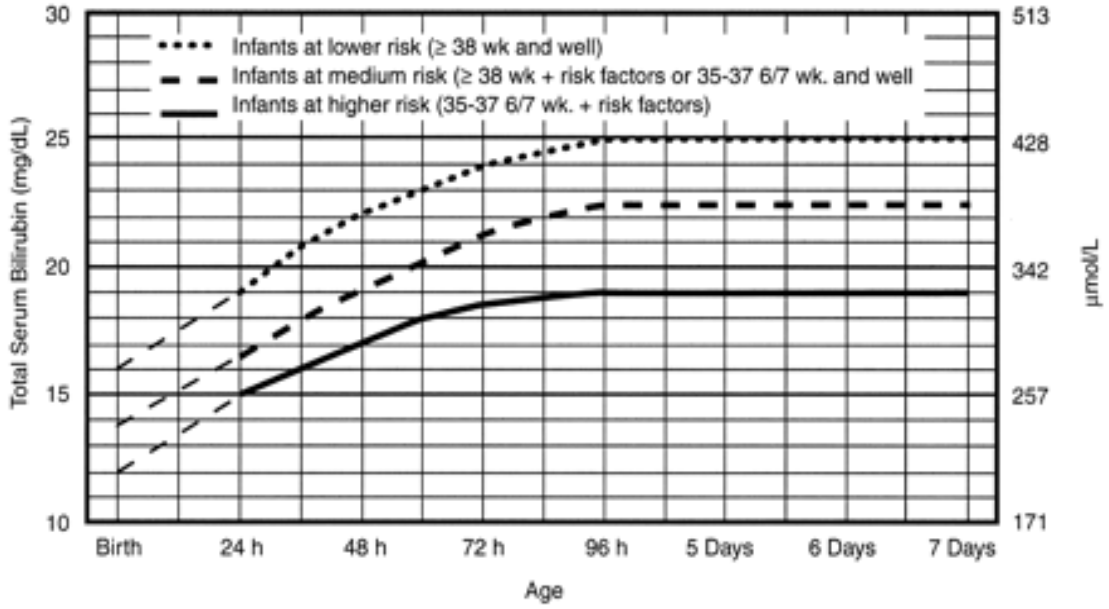
	Total serum bilirubin (mg/dL)			
Birth weight	**Healthy baby**		**Sick baby**	
	Phototherapy	Exchange transfusion	Phototherapy	Exchange transfusion
<1000 gm	5-7	11-13	4-6	10-12
1001-1500 gm	7-10	13-15	6-8	11-13
1501-2000 gm	10-12	15-18	8-10	13-15
2001-2500 gm	12-15	18-20	10-12	15-18

AAP nomogram for phototherapy in hospitalized infants of 35 or more weeks' gestation.



(Risk factors: isoimmune hemolytic anemia, hypoalbuminemia, asphyxia, temperature instability, hypothermia, , temperature instability ,significant lethargy, G6PD deficiency ,acidosis and sepsis)

AAP nomogram for exchange transfusion in infants 35 or more weeks' gestation



3. HYPOGLYCEMIA :

All preterm neonates were monitored for hypoglycemia by checking capillary blood glucose before every feed till 48hours of life and decided further based on clinical status as per NICU protocol .

Capillary blood glucose less than 40 mg /dl is considered as hypoglycemia .

Symptomatic hypoglycemia refers to Capillary blood glucose less than 45 mg /dl

associated with lethargy , temperature instability ,convulsions.

4.SEPSIS :

C Reactive protein :

C Reactive protein assessment is used for sepsis screening

CRP is quantitated by nephalometry in 2 ml of unheparinised sample.

Normal range : < 0.6 mg/dl

If sepsis screen is positive , prior to initiation of antibiotic therapy blood culture is done

Blood culture:

Under strict aseptic precautions , skin over site of venipuncture should be cleaned with 70 % isopropyl alcohol and povidone iodine following which 1 ml of blood is sampled in a blood culture bottle 5- 10 of culture media.

Blood culture samples analysed by BACTEC or BACT ALERT can detect bacterial growth at low concentration of 1-2 CFU /ml within 12- 24 hours .

Blood culture is considered to be sterile if there is no bacterial growth after 7 days of incubation.

Urine culture :

5ml of urine sample is obtained in a sterile container by supra pubic puncture, bladder catheterization or clean catch of midstream urine.

Urine analysis is done for leucocyte esterase , nitrites and microscopy and findings are correlated with urine culture reports.

UTI may be diagnosed in the presence of one of the following:

(a) >10 WBC/mm3 in a 10 mL centrifuged sample

(b) >104 organisms/mL in urine obtained by catheterization and

(c) any organism in urine obtained by suprapubic aspiration.

CSF Culture :

In neonates with culture proven sepsis ,CSF analysis is done .

Under strict aseptic precautions , lumbar puncture is done and 1-2 ml of CSF fluid is sampled for biochemical analysis , cell counts , Gram stain and culture

5) NECROTIZING ENTEROCOLITIS :

Modified Bell's staging is used for diagnosis of necrotizing enterocolitis (NEC).

STATISTICAL METHODS :

1. Data of the preterm infants were entered in Microsoft excel .

2. Description of baseline characteristics of study population was made

3. All analyses were done with SPSS software Version 19.0.

4. Proportions were compared by using Chi square and Fisher's exact tests to find out the statistical significance .

5. Value of $p < 0.05$ is considered to be statistically significant .

6. Odds ratio and their 95% confidence intervals were calculated.

Chi square test measures the discrepancy between the observed cell counts and what would be expected if the columns and rows were unrelated .

Odds ratio is for assessment of risk of a particular outcome (or disease) if a certain factor (or exposure) is present .

7. Statistical analyses were made for preterm infants less than 37 weeks of gestational age with the variables.

8. Statistical analyses were then made for late preterm and early preterm newborns with the variables separately.

RESULTS:

TOTAL LIVE DELIVERIES (APRIL 2014 – MARCH 2015) :- **2488**

⇩

Live deliveries during Study Period :- **1242**

(6 consecutive months from September 2014 to February 2015)

⇩

Live preterm deliveries during Study Period :- **142**

⇩ ⟹ **EXCLUSION** :

Twin deliveries 10 pairs , anomalies (2)

STUDY POPULATION INCLUDED **130** PRETERM BIRTHS

⇩

Spontaneous Preterm Birth **78**		Indicated Preterm Birth **52**

⇩ ⇩

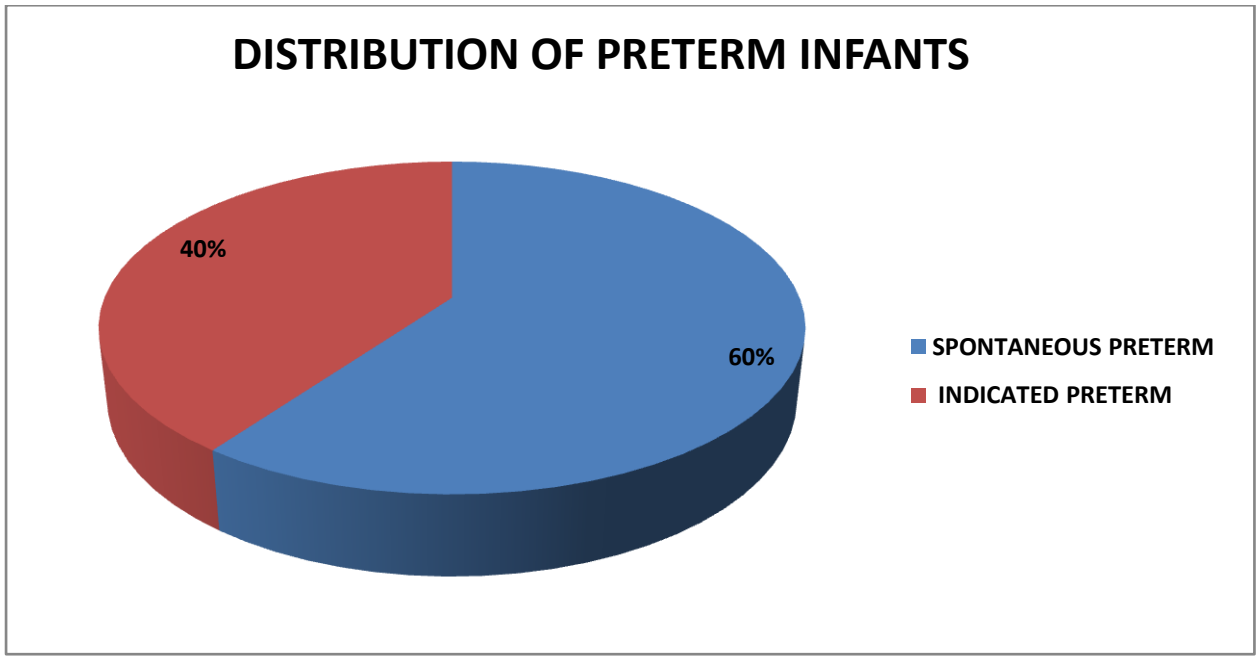
Late Preterm **61**	Early Preterm **17**

Late Preterm **46**	Early Preterm **6**

TABLE 1:

DISTRIBUTION OF SPONTANEOUS AND INDICATED PRETERM INFANTS

	Frequency	Percentage
Spontaneous preterm infants	78	60%
Indicated preterm infants	52	40 %

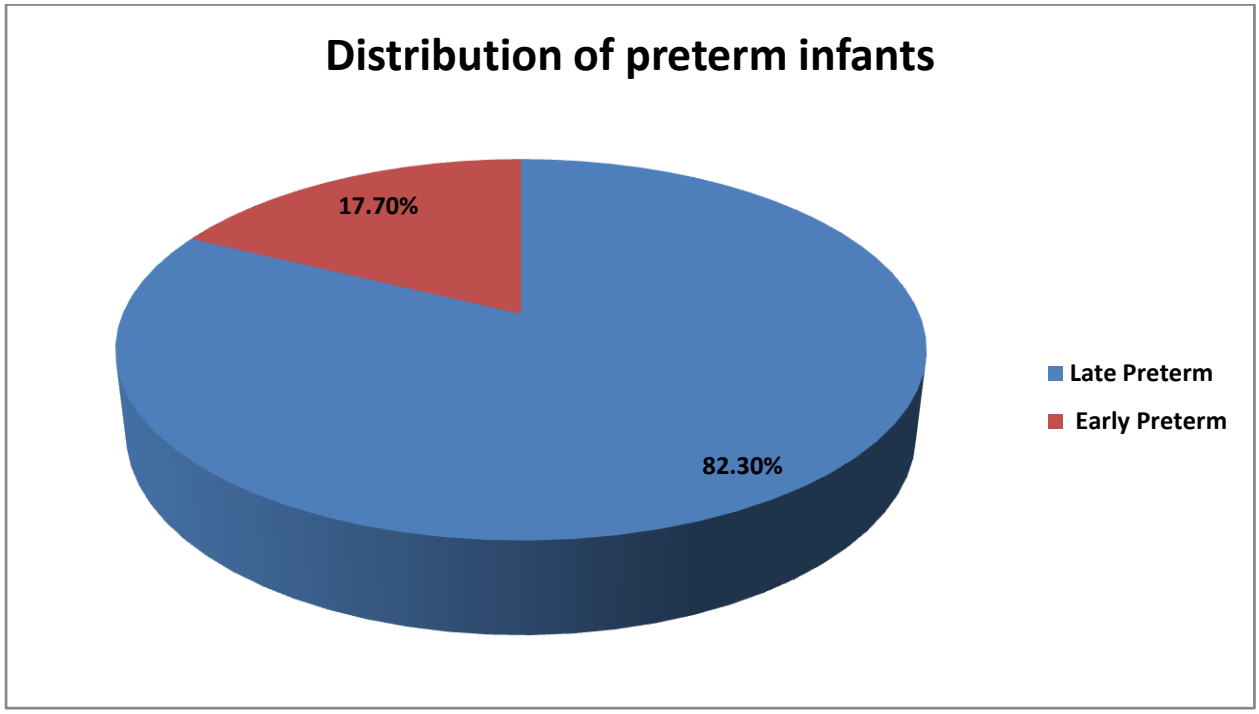


Out of 130 Preterm newborns included, there were 78 spontaneous preterm (60%) and 52 indicated preterm infants (40%) .

TABLE 2 :

DISTRIBUTION OF LATE PRETERM AND EARLY PRETERM INFANTS

	Frequency	**Percentage**
Late preterm infants	107	82.3 %
Early preterm infants	23	17.7 %

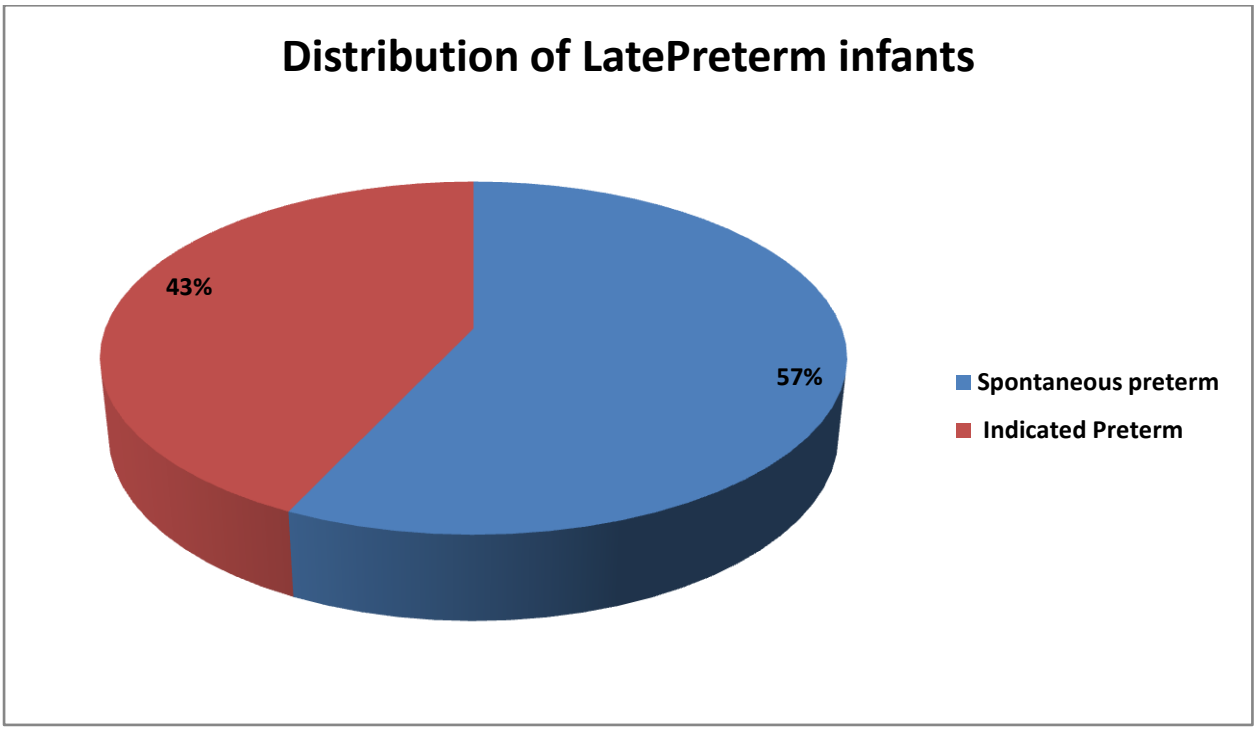


Out of 130 Preterm newborns , there were 107 Late preterm (82.3%) and 23 early preterm infants (17.7 %).

TABLE 3 :

DISTRIBUTION OF SPONTANEOUS AND INDICATED PRETERM INFANTS AMONG LATE PRETERM GROUP

	Frequency	Percentage
Spontaneous Preterm	61	57 %
Indicated Preterm	46	43%

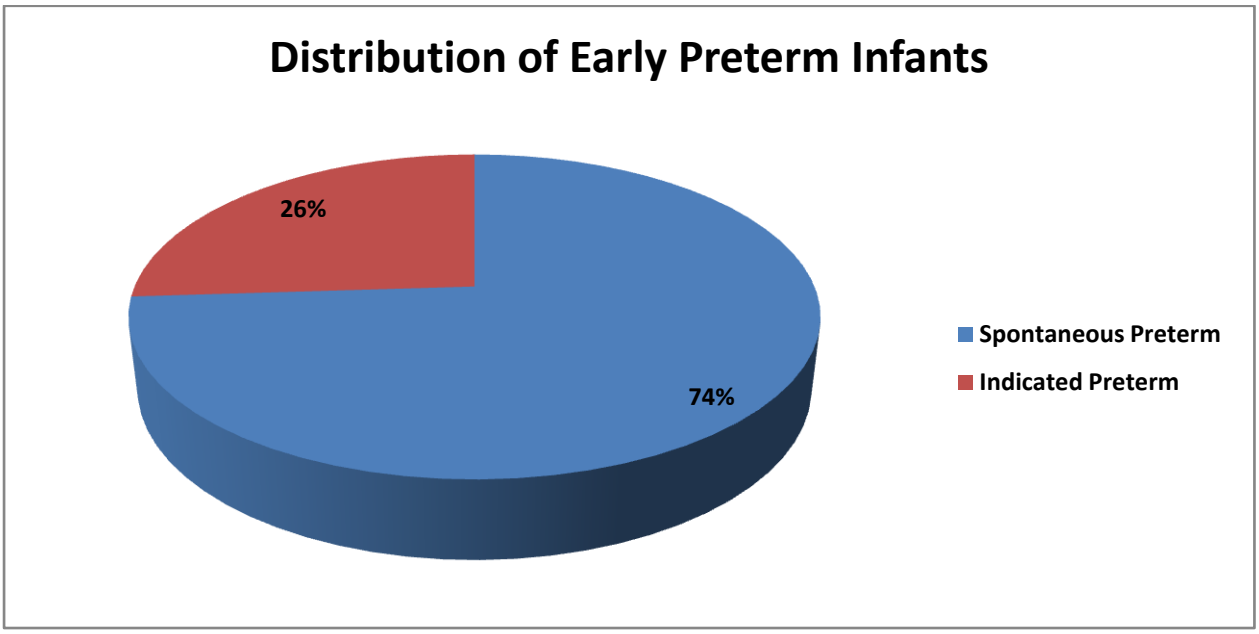


Out of 107 Late Preterm newborns , there were 61 spontaneous preterm (57 %) and 46 indicated preterm infants (43 %).

TABLE 4 :

DISTRIBUTION OF SPONTANEOUS AND INDICATED PRETERM INFANTS AMONG EARLY PRETERM GROUP

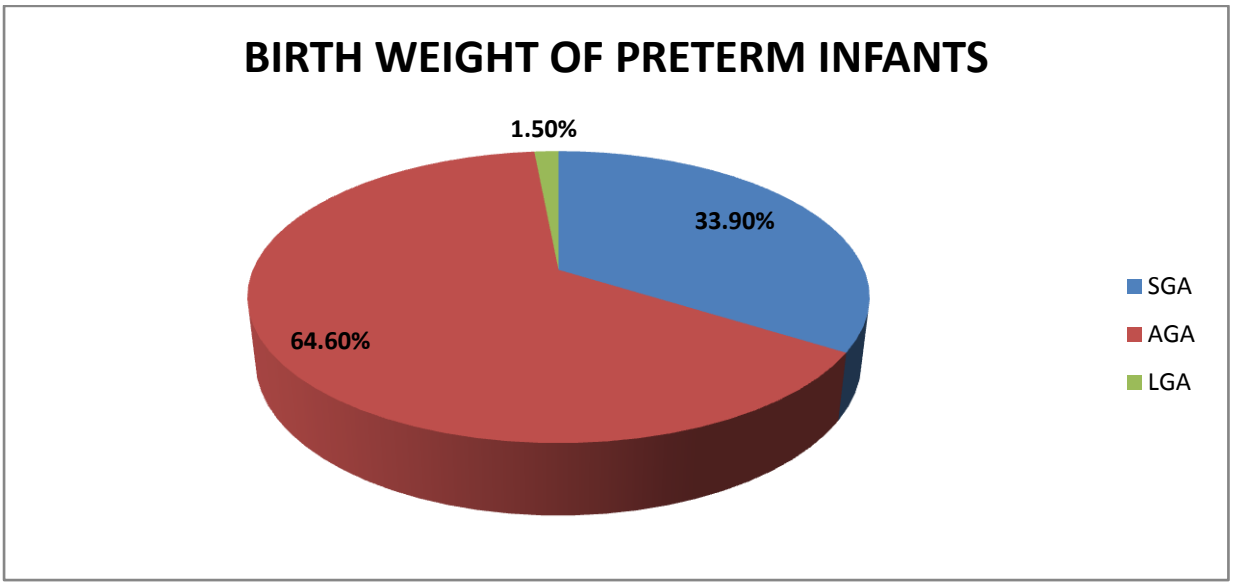
	Frequency	Percentage
Spontaneous Preterm	17	74 %
Indicated Preterm	6	26%



Out of 23 Early Preterm newborns , there were 17 spontaneous preterm (74 %) and 6 indicated preterm infants (26 %).

TABLE 5: DISTRIBUTION OF BIRTH WEIGHT AMONG PRETERM INFANTS

	Frequency	Percentage
SGA	44	33.9 %
AGA	84	64.6 %
LGA	2	1.5%



This tabulation shows the classification of preterm infants based on birth weight (as per Fenton 's chart) into Appropriate for gestational age , Large for gestational age and Small for gestational age

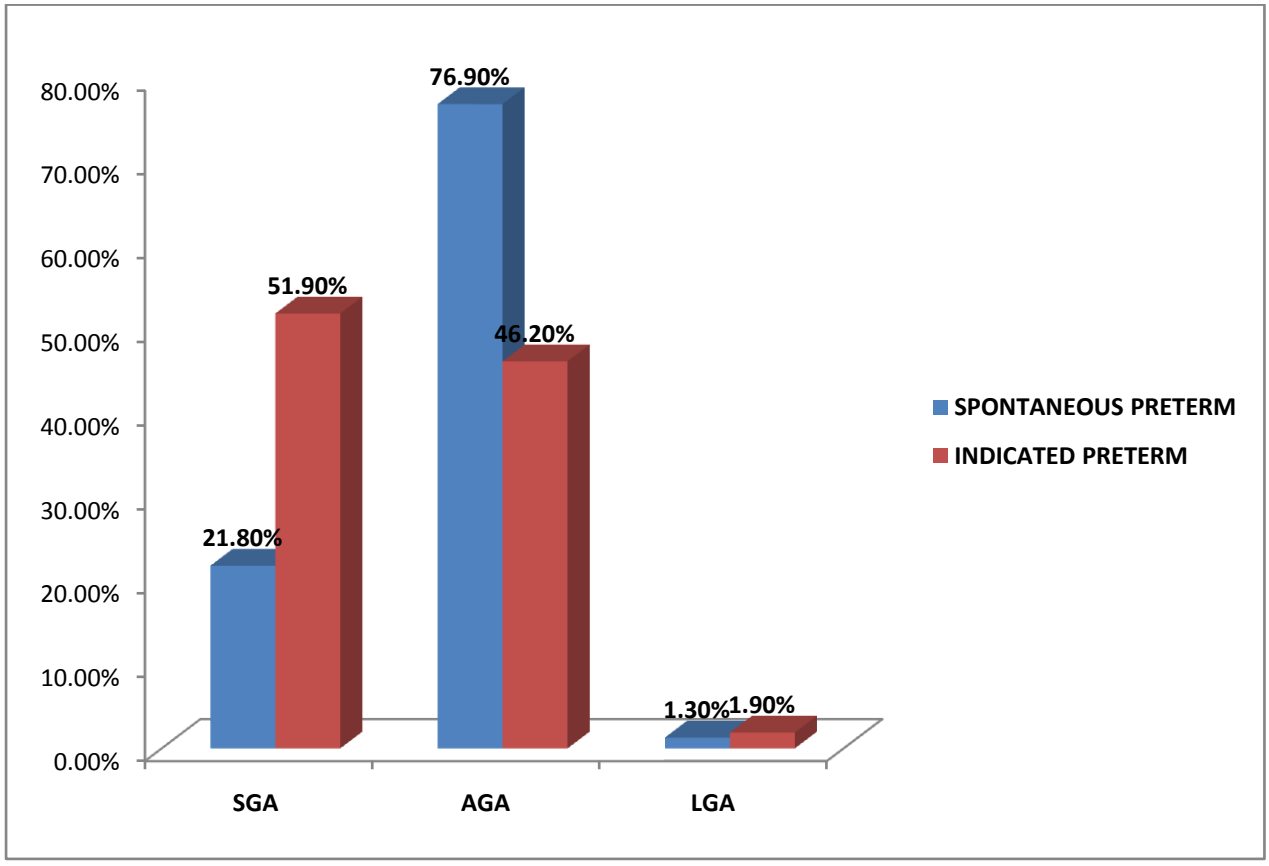
Among the 130 preterm infants , 84 are Appropriate for gestational age (64.6 %) , 2 Large for gestational age (1.5 %) and 44 Small for gestational age (33.9 %).

Thus majority of pre term infants were appropriate for gestational age (64.6 %).

TABLE 6:

DISTRIBUTION OF SPONTANEOUS AND INDICATED PRETERM INFANTS BASED ON BIRTH WEIGHT

	SPONTANEOUS PRETERM		INDICATED PRETERM	
SGA	17	21.8%	27	51.9%
AGA	60	76.9%	24	46.2%
LGA	1	1.3%	1	1.9%



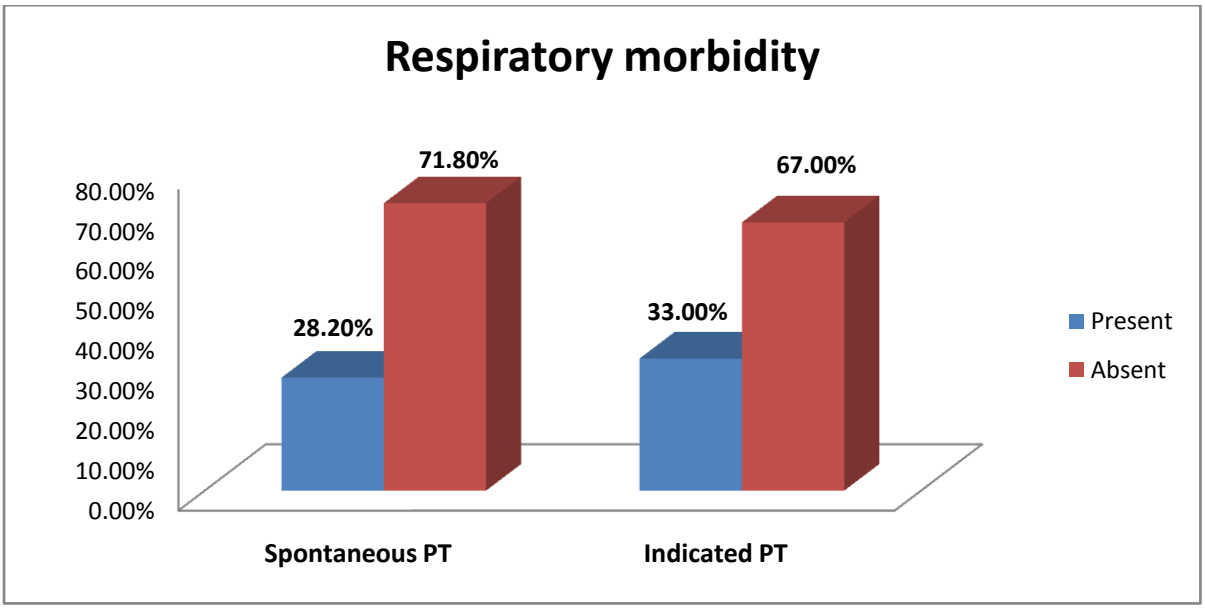
Among 78 infants in the spontaneous preterm group , 60 (76.9 %) were appropriate for gestational age and 17 (21.8 %) were small for gestational age .

Among 52 infants in the indicated preterm group , 24 (46. 2 %) were appropriate for gestational age and 27 (51. 9 %) were small for gestational age .

Hence major proportion of spontaneous preterm infants (76.9 %) were appropriate for gestational age and major proportion of indicated preterm infants (51.9%) were small for gestational age .

TABLE 7: COMPARISON OF RESPIRATORY MORBIDITY AMONG SPONTANEOUS AND INDICATED PRETERM INFANTS

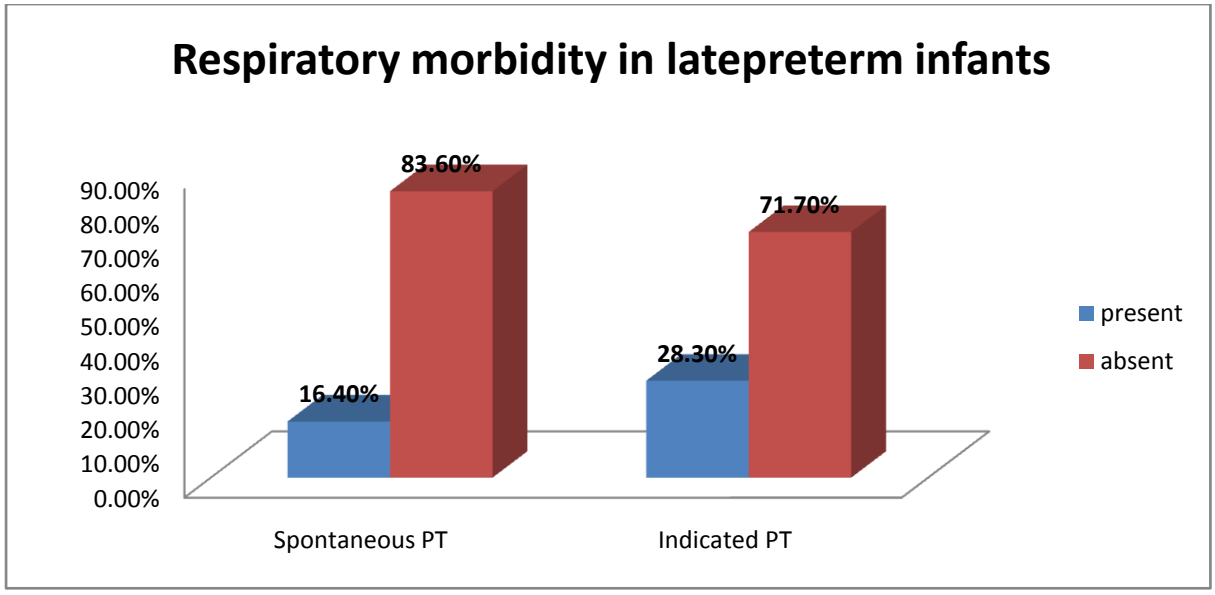
Respiratory morbidity	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odd ratio
Present	22	28.2 %	17	33 %				
Absent	56	71.8 %	35	67%	0.38	0.35 -1.85	0.58	0.81
	78		52					



Among the preterm infants , 28.2 % of spontaneous preterm infants have respiratory morbidity compared to 33% of indicated preterm infants and this is not statistically significant

TABLE 8 : COMPARISON OF RESPIRATORY MORBIDITY AMONG SPONTANEOUS AND INDICATED LATE PRETERM INFANTS

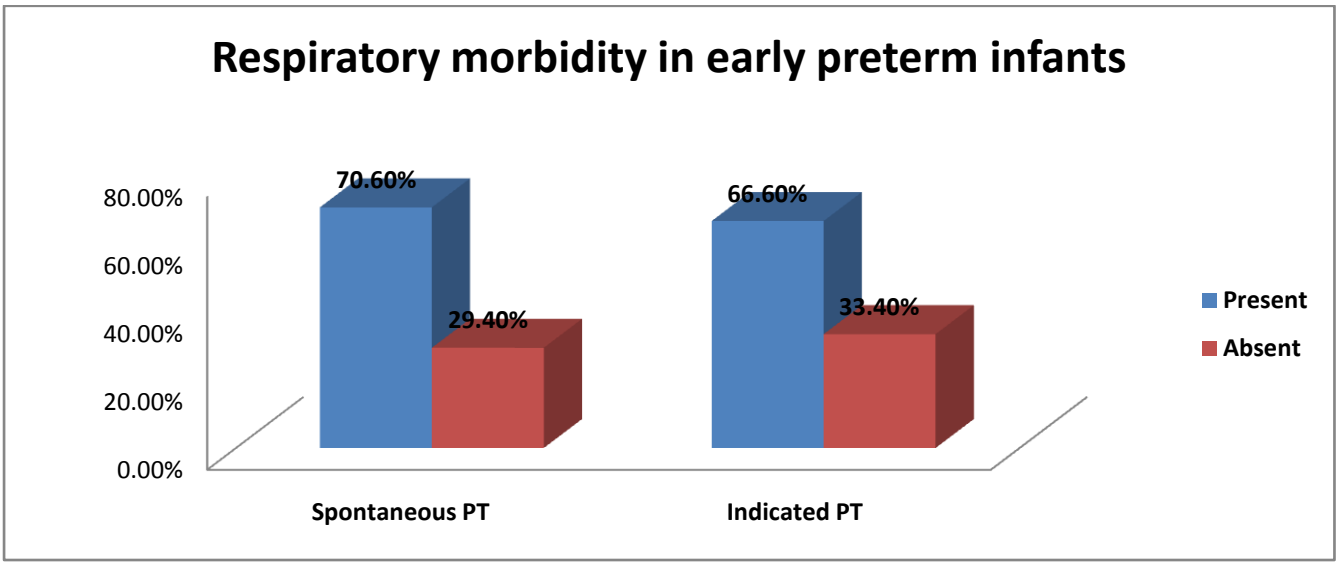
Respiratory morbidity	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	10	16.4 %	13	28.3%	2.19	0.18-1.39	0.13	0.50
Absent	51	83.6%	33	71.7%				
	61		46					



Among the late preterm infants , 16.4% of spontaneous preterm infants have respiratory morbidity compared to 28.3 % of indicated preterm infants and this is not statistically significant .

TABLE 9 : COMPARISON OF RESPIRATORY MORBIDITY AMONG SPONTANEOUS AND INDICATED EARLY PRETERM INFANTS

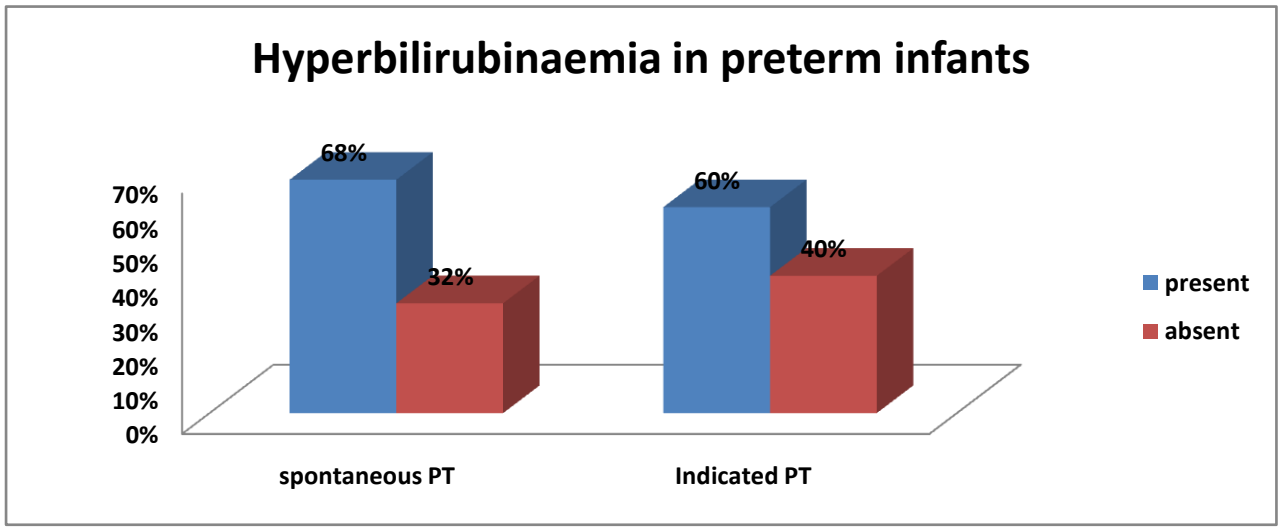
Respiratory morbidity	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	12	70.6%	4	66.6 %	0.03	0.11-12.70	0.85	1.20
Absent	5	29.4 %	2	33.4%				
	17		6					



Among the early preterm infants , 70.6 % of spontaneous preterm infants have respiratory morbidity compared to 66 .6 % of indicated preterm infants and this is not statistically significant.

TABLE 10 : COMPARISON OF NEONATAL HYPERBILIRUBINAEMIA AMONG SPONTANEOUS AND INDICATED PRETERM INFANTS

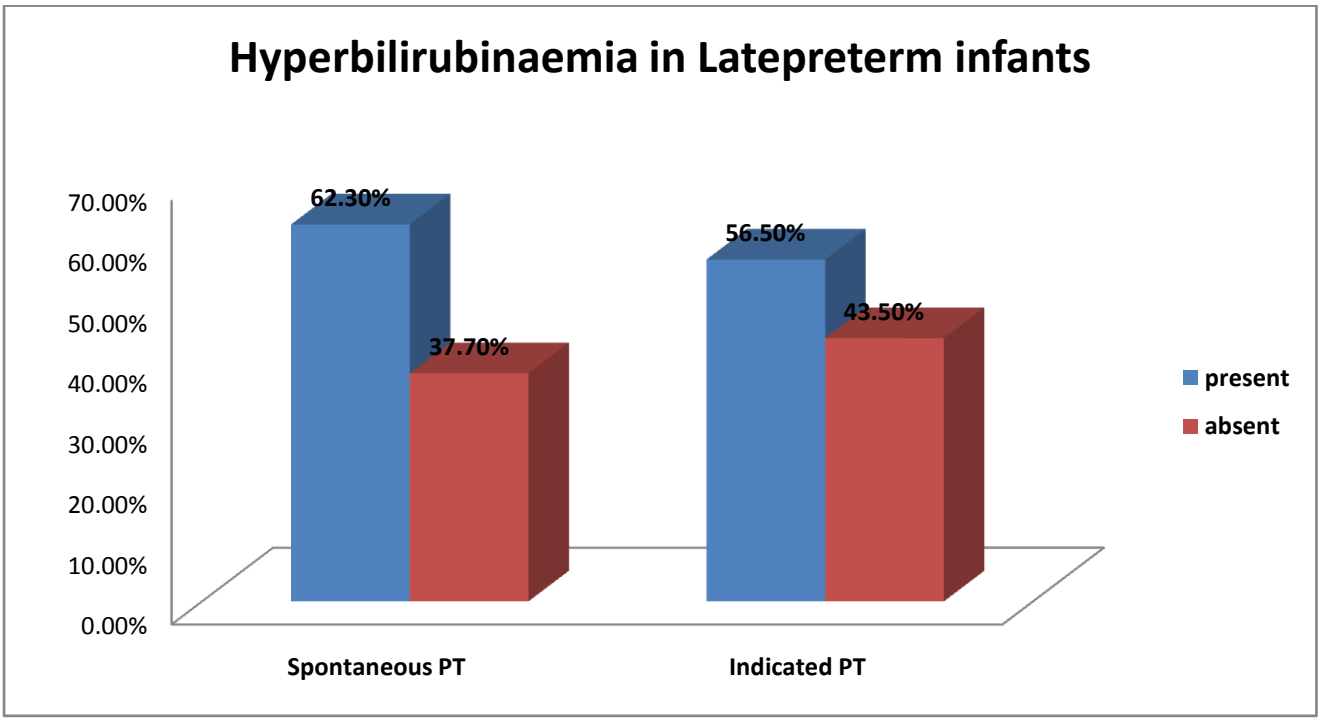
Neonatal hyperbilirubinaemia	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	53	68 %	31	60%	0.95	0.65 -3.10	0.33	1.44
Absent	25	32 %	21	40%				
	78		52					



Among the preterm infants , 68 % of spontaneous preterm infants have hyperbilirubinaemia compared to 60 % of indicated preterm infants and this is not statistically significant.

TABLE 11 : COMPARISON OF NEONATAL HYPERBILIRUBINAEMIA AMONG SPONTANEOUS AND INDICATED LATE PRETERM INFANTS

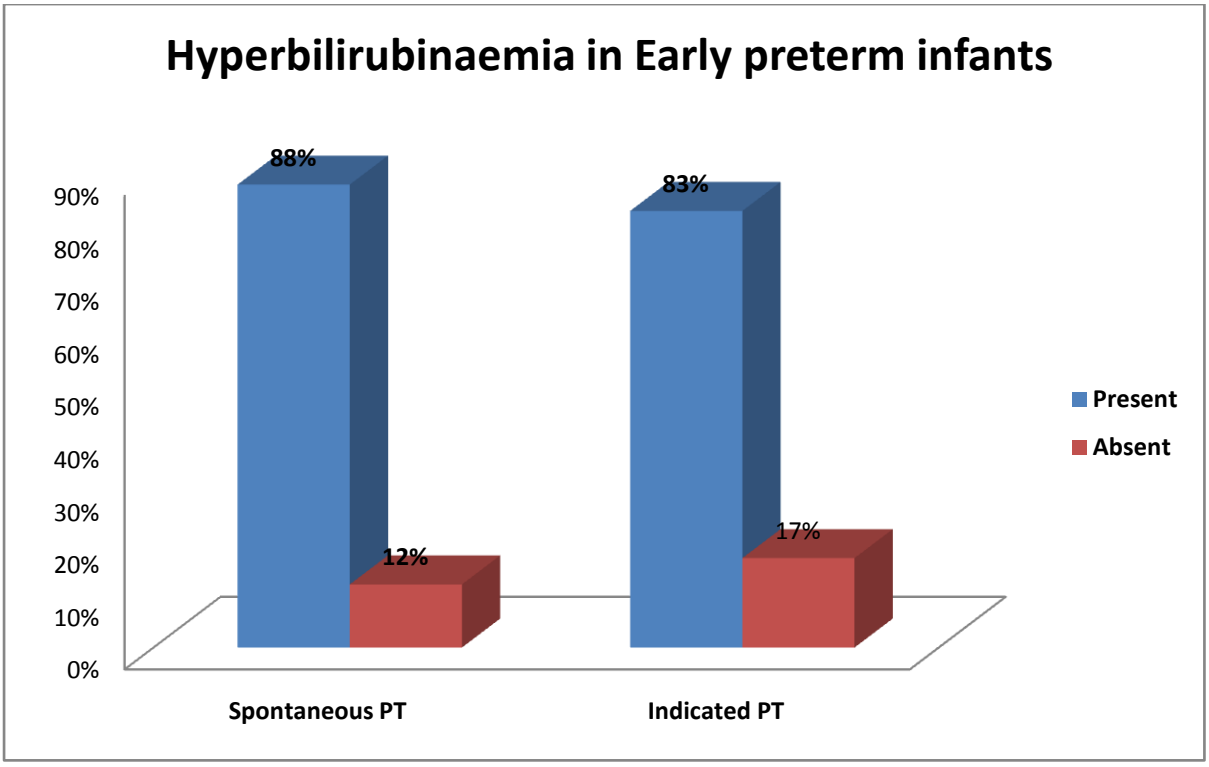
Neonatal hyperbilirubinaemia	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	38	62.3 %	26	56.5 %	0.36	0.54 – 2.98	0.54	1.27
Absent	23	37.7%	20	43.5%				
	61		46					



Among the late preterm infants , 62 .3 % of spontaneous preterm infants have hyperbilirubinaemia compared to 56.5 % of indicated preterm infants and this is not statistically significant.

TABLE 12 : COMPARISON OF NEONATAL HYPERBILIRUBINAEMIA AMONG SPONTANEOUS AND INDICATED PRETERM INFANTS IN EARLY PRETERM GROUP

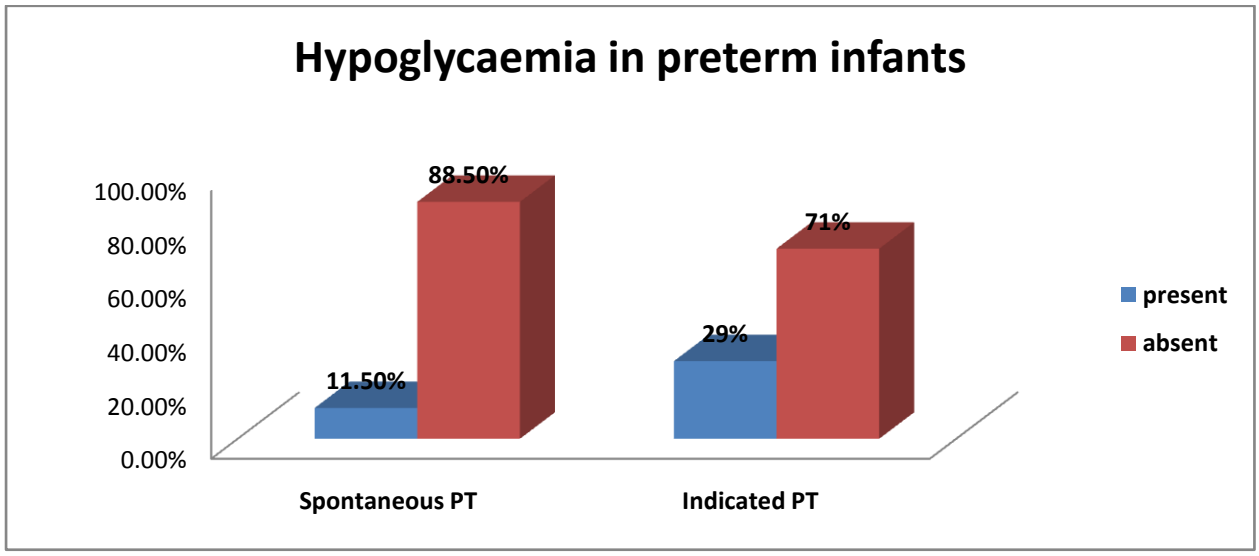
Neonatal hyperbilirubinaemia	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	15	88 %	5	83%	0.09	0-31.28	0.75	1.50
Absent	2	12%	1	17%				
	17		6					



Among the early preterm infants , 88 % of spontaneous preterm infants have hyperbilirubinaemia compared to 83 % of indicated preterm infants and this is not statistically significant.

TABLE 13 : COMPARISON OF HYPOGLYCAEMIA AMONG SPONTANEOUS AND INDICATED PRETERM INFANTS

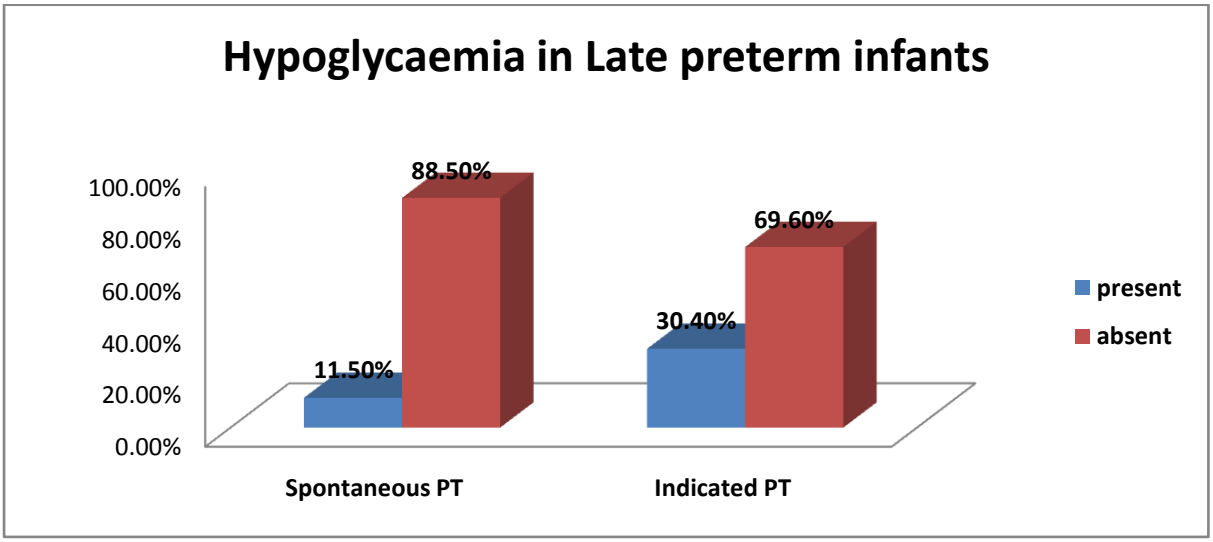
Hypoglycemia	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	9	11.5 %	15	29 %	6.21	0.12 -0.88	0.012	0.32
Absent	69	88.5%	37	71%				
	78		52					



11.5 % of spontaneous preterm infants have hypoglycemia compared to 29 % of indicated preterm infants and this is statistically significant with p value 0.012 .

TABLE 14 : COMPARISON OF HYPOGLYCAEMIA AMONG SPONTANEOUS AND INDICATED LATE PRETERM INFANTS

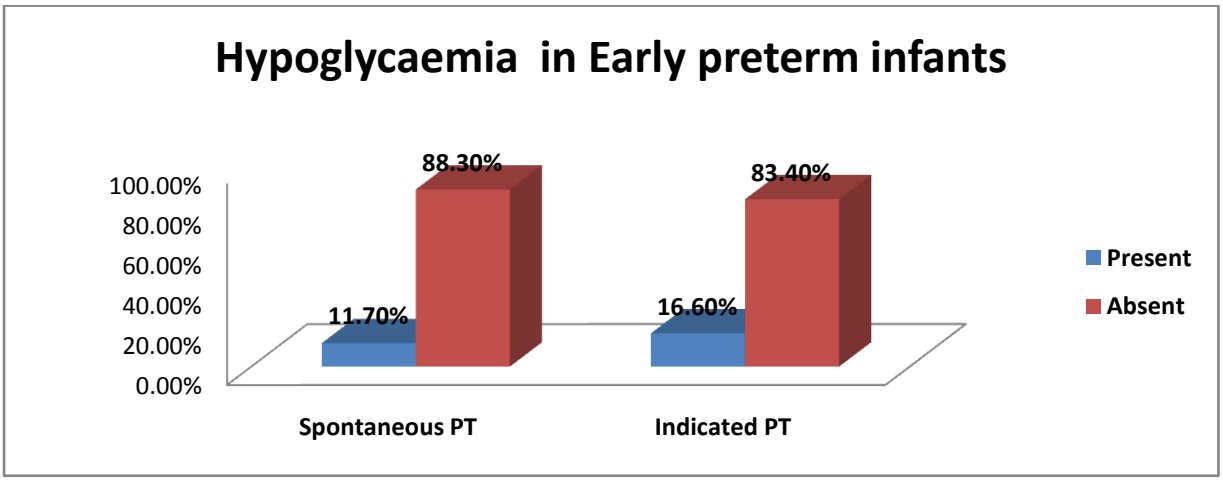
Hypoglycemia	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	7	11.5 %	14	30.4%	5.98	0.10-0.89	0.01	0.30
Absent	54	88.5%	32	69.6%				
	61		46					



Among the late preterm infants , 11.5 % of spontaneous preterm infants have hypoglycemia compared to 30.4 % of indicated preterm infants and this is statistically significant with p value 0.01 .

TABLE 15 : COMPARISON OF HYPOGLYCAEMIA AMONG SPONTANEOUS AND INDICATED EARLY PRETERM INFANTS

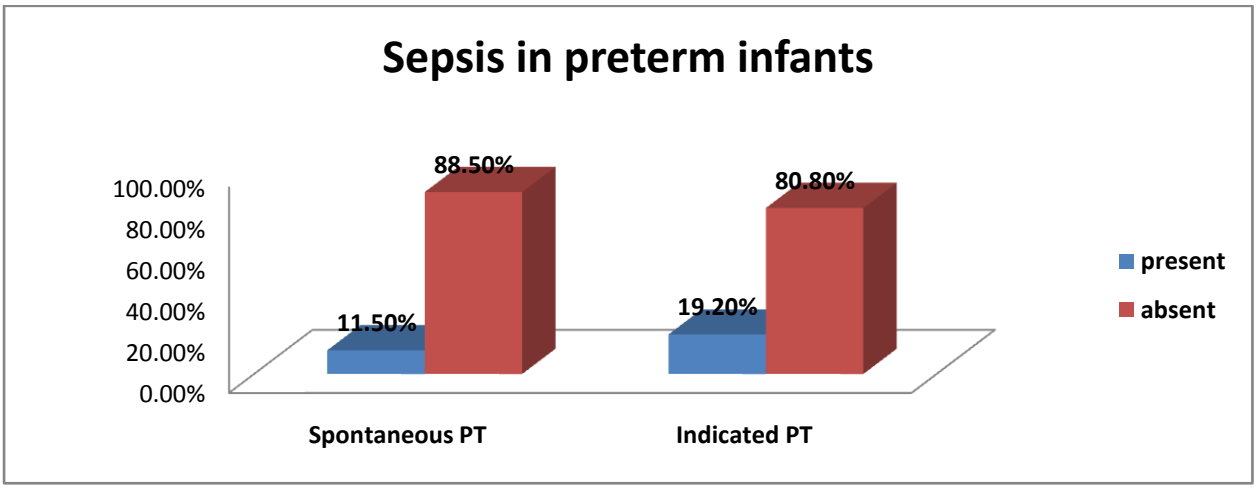
Hypoglycemia	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	2	11.7 %	1	16.6%	0.09	0.03 – 23.29	0.75	0.67
Absent	15	88.3%	5	83.4%				
	17		6					



Among the early preterm infants , 11.7 % of spontaneous preterm have hypoglycemia compared to 16 .6 % of indicated preterm infants and this is not statistically significant .

TABLE 16 : COMPARISON OF SEPSIS AMONG SPONTANEOUS AND INDICATED PRETERM INFANTS

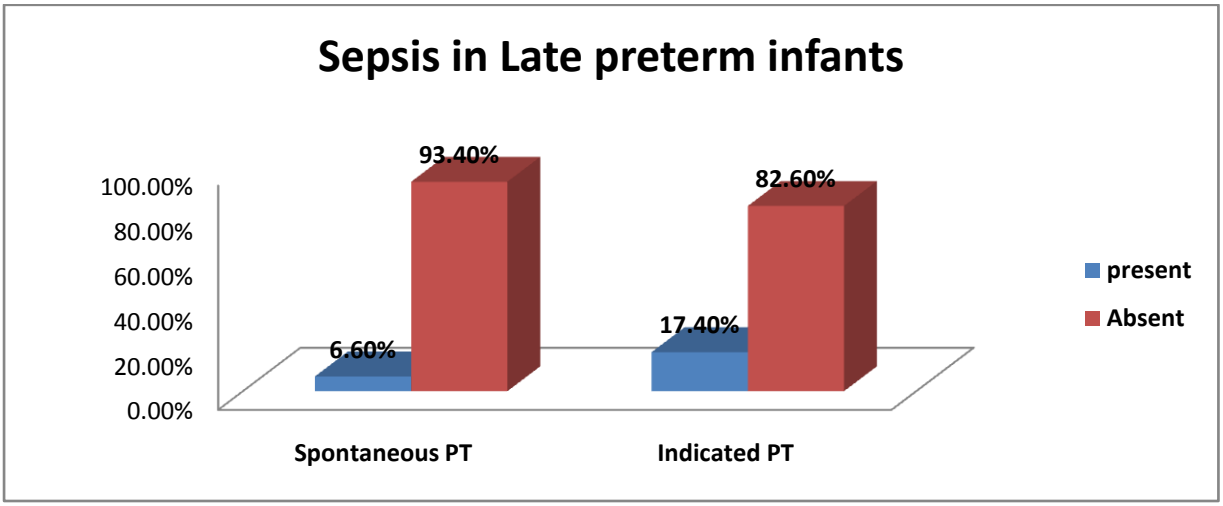
Sepsis	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	9	11.5 %	10	19.2 %	1.48	0.19-1.61	0.22	0.55
Absent	69	88.5%	42	80.8%				
	78		52					



Among the preterm infants , 11.5 % of spontaneous preterm infants have sepsis compared to 19.2 % of indicated preterm infants and this is not statistically significant .

TABLE 17 : COMPARISON OF SEPSIS AMONG SPONTANEOUS AND INDICATED LATE PRETERM INFANTS

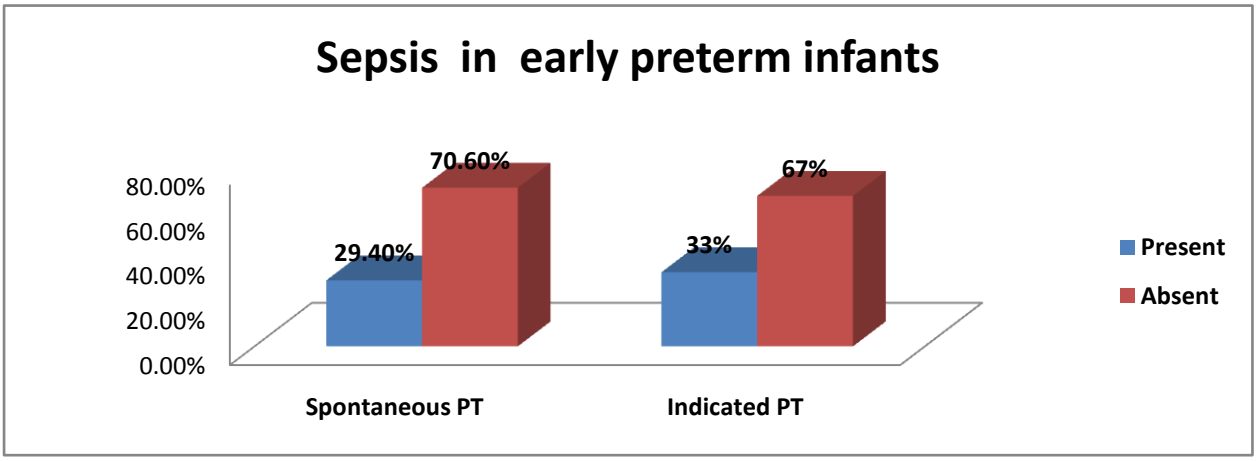
Sepsis	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	4	6.6 %	8	17.4%	3.09	0.08- 1.34	0.07	0.33
Absent	57	93.4%	38	82.6%				
	61		46					



Among the late preterm infants , 6.6 % of spontaneous preterm infants have sepsis compared to 17.4 % of indicated preterm infants and this is not statistically significant .

TABLE 18 : COMPARISON OF SEPSIS AMONG SPONTANEOUS AND INDICATED EARLY PRETERM INFANTS

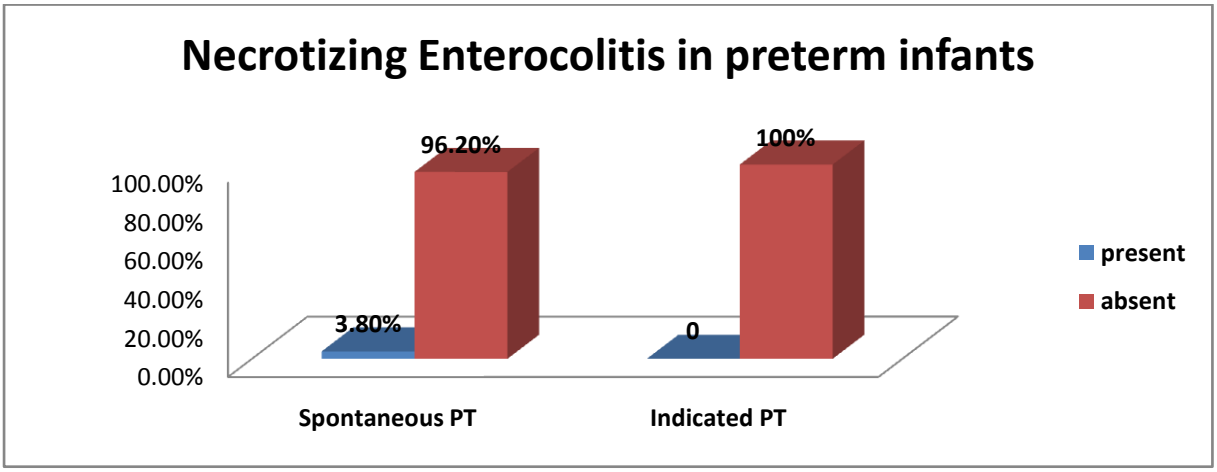
sepsis	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	5	29.4 %	2	33%	0.03	0.08- 9.44	0.85	0.83
Absent	12	70.6 %	4	67%				
	17		6					



Among the early preterm infants , 29.4% of spontaneous preterm infants have sepsis compared to 33 % of indicated preterm infants and this is not statistically significant .

TABLE 19 : COMPARISON OF NECROTIZING ENTEROCOLITIS AMONG SPONTANEOUS AND INDICATED PRETERM INFANTS

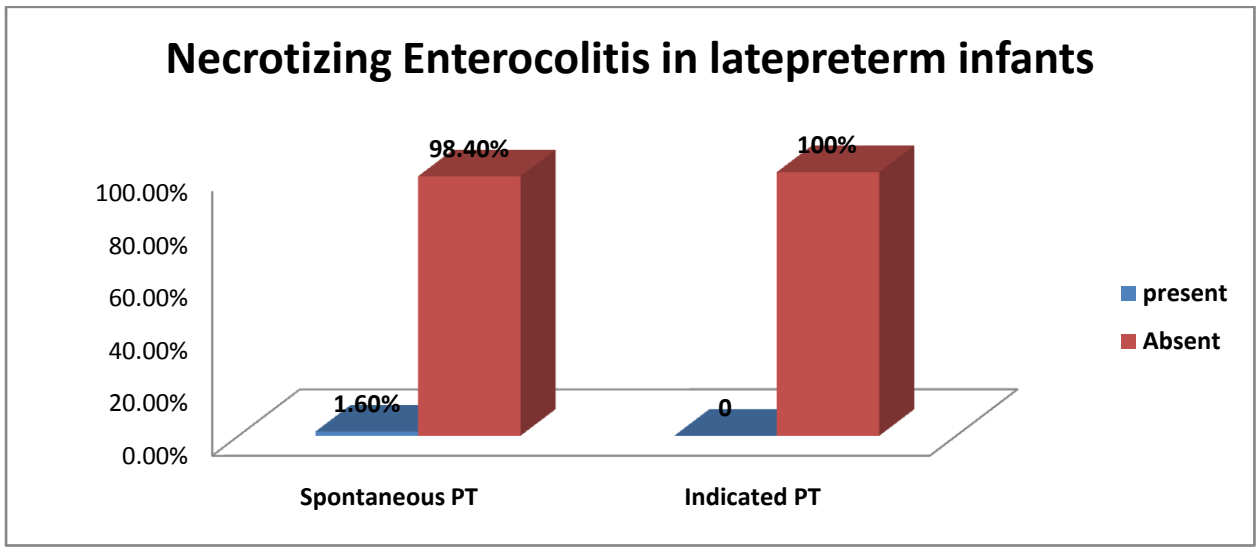
Necrotizing entero colitis	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	3	3.8 %	0	-	2.05	-	0.15	undefined
Absent	75	96.2%	52	100%				
	78		52					



Among the preterm infants , 3.8% of spontaneous preterm infants have necrotizing enterocolitis compared to 0% of indicated preterm infants and this is not statistically significant

TABLE 20 : COMPARISON OF NECROTISING ENTEROCOLITIS AMONG SPONTANEOUS AND INDICATED LATE PRETERM INFANTS

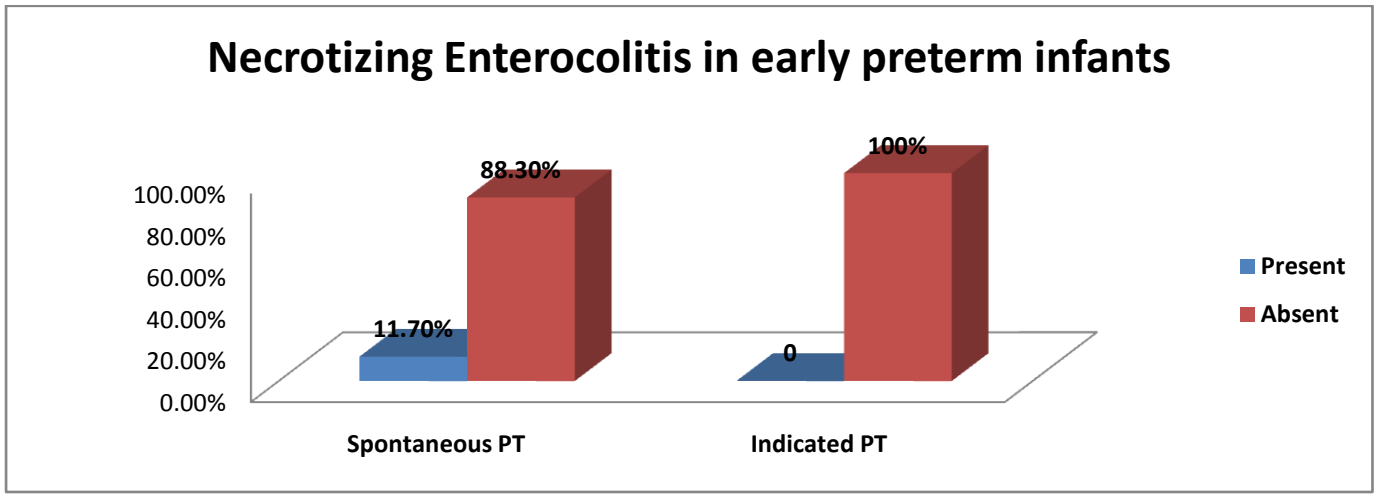
Necrotizing entero colitis	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	1	1.6%	0	-	0.76	-	0.38	undefined
Absent	60	98.4%	46	100%				
	61		46					



Among the late preterm infants , 1.6 % of spontaneous preterm infants have necrotizing enterocolitis compared to 0% of indicated preterm infants and this is not statistically significant .

TABLE 21: COMPARISON OF NECROTISING ENTEROCOLITIS AMONG SPONTANEOUS AND INDICATED EARLY PRETERM INFANTS

Necrotizing entero colitis	Spontaneous Preterm		Indicated Preterm		Chi square	Confidence interval	P value	Odds ratio
Present	2	11.7 %	0	-	0.77	-	0.37	undefined
Absent	15	88.3%	6	100 %				
	17		6					



Among the early preterm infants , 11.7% of spontaneous preterm infants have necrotizing enterocolitis compared to 0% of indicated preterm infants and this is not statistically significant .

DISCUSSION

Out of 1242 live born deliveries during the study period of 6 months from september 2014 to february 2015 , there were 142 preterm deliveries. Out of 142 preterm deliveries , 10 pairs of twin deliveries and 2 infants with anomalies were excluded and 130 preterm neonates were included in the study .

Among the 130 study participants , there were 78 (60%) spontaneous preterm neonates and 52 (40 %) indicated preterm neonates.

Study by Nkyekyer et al[24] showed the preterm birth rate to be 9.3 % with 61% of spontaneous preterm infants and 39 % of indicated preterm infants.

Study by Auger et al [66] reported that with preterm birth rate of 6.2 % , there were 28.7 % Indicated preterm births and spontaneous preterm from PPROM to be 30.7 % and from preterm labour to be 40.6 % .

Study by Ananth CV et al[4] showed that 40 % of preterm births were indicated preterm . Study by Kase BA et al [64] showed that out of 765 women with hypertension , 32.2 % delivered preterm comprising of 10.5 % spontaneous and 21.6% indicated preterm birth .

In this study 76.9 % of spontaneous preterm infants were appropriate for gestational age and major proportion of indicated preterm infants (51.9%) were small for gestational age . Study by Norman et al [18] showed that major proportion of the Indicated preterm infants were SGA suggesting the influence of intrauterine compromise resulting in growth restriction . Study by Villar et al [3] Small for gestational age neonates was highest among the medically indicated preterm delivery group (22.3%). Study by Lee JH et al [25]stated that indicated preterm birth had a significantly higher mean gestational age at birth, but lower mean birth weight .Study by Kase BA et al [64]reported that most Indicated preterm birth less than 30 weeks of gestational age were SGA .

In terms of Respiratory morbidity , this study showed that 28.2 % of spontaneous preterm infants had respiratory morbidity compared to 33% of indicated preterm infants . Though indicated preterm neonates have higher risk for respiratory morbidity in comparison with spontaneous group , this is not statistically significant. spontaneous and indicated preterm infants in late preterm and early preterm sub groups had no statistically significant difference in terms of adverse respiratory outcome .

Study by Lee JH et al [25]on 243 preterm neonates of 24-32 weeks gestational age showed that 47 % incidence of respiratory distress .Among them 58.1 % were indicated preterm and 38.4 %were spontaneous preterm . Study by Riity MK et al [12] on singleton birth of 24 -33 weeks gestational age reported the incidence of respiratory distress syndrome to be 73 % in medically indicated group compared to 53 % spontaneous preterm which was of statistical significance.

Study by Yang LC et al [26] on spontaneous preterm of 16 – 26 weeks gestational age (extreme prematurity) due to PPROM showed that 38 out 73 infants survived .Hence all the survivors had respiratory distress with incidence of was 100% . Shimoya et al [27] reported that chorioamnionitis induces fetal lung maturation resulting in reduction of incidence of RDS and stated that 59.9 % of the spontaneous preterm birth had histological chorioamnionitis compared to 9.3% among the indicated pretermbirth group ($p<.001$). Study by Feldman K et al [29] reported that indicated late preterm infants born following Caesarean without labour were at increased risk of needing resuscitation (OR 2.43) and of developing Transient tachypnea of new born (OR 1.43) , Respiratory distress syndrome(OR 2.33) , apneic spells (OR 1.29) on comparison with spontaneous preterm .

In terms of hyperbilirubinemia ,this study showed that 68 % of spontaneous preterm infants had hyperbilirubinemia compared to 60 % of indicated preterm infants and this is not statistically significant. sub grouping of spontaneous and indicated preterm infants into late and early preterm had no statistically significant difference .

Study by Uma S et al [6] reported that 50% of spontaneous preterm babies irrespective of the gestational age have jaundice .Study by Melamed et al [35] reported that among spontaneous late preterm neonates about 18% had jaundice requiring phototherapy compared to 2.5 % in term newborns . Sehgal et al [34] reported that 78 % of extremely low birth weight babies had hyperbilirubinemia.

Study by Feldman K et al [29]reported that indicated late preterm infants born following induced labour were at increased risk of hyperbilirubinemia with Odds Ratio 1.14; 95% CI 1.03 to 1.27 compared to spontaneous preterm infants .

In terms of hypoglycemia ,this study showed that 11.5 % of spontaneous preterm infants have hypoglycemia compared to 29 % of indicated preterm infants and this is statistically significant with p value 0.012 . Among the subgroup of late preterm infants , 11.5 % of spontaneous late preterm infants have hypoglycemia compared to 30.4 % of indicated preterm infants and this is statistically significant with p value 0.01 . The early preterm subgroup showed no statistically significant difference (p value 0.75). Study by Riity MK et al [12] on singleton birth of 24 -33 weeks gestational age reported the incidence of hypoglycemia to be 79% in indicated preterm neonates compared to 49 % of spontaneous preterm which was of statistical significance.

Study by Melamed et al [35]reported that among spontaneous late preterm neonates about 6.8% had hypoglycemia compared to 0.4 % in term newborns which was statistically significant. Study by Feldman K et al[29] reported that indicated late preterm infants born following Caesarean section without labour were at increased risk of hypoglycemia with Odds Ratio 1.97; 95% CI 1.63 to 2.39 on comparison with spontaneous labour .

In terms of sepsis, this study showed that 11.5 % of spontaneous preterm infants have sepsis compared to 19.2 % of indicated preterm infants and this is not

statistically significant . Sub grouping of spontaneous and indicated preterm infants into late and early preterm had no statistically significant difference .

Natale et al[49] reported 70 % incidence of sepsis in late preterm infants .Mc Intire et al[50] reported that late preterm infants have 2 to 5 times higher incidence of culture proven sepsis and 80 % of late preterm delivery were result of Preterm labor and preterm premature rupture of membranes and hence this major proportion of spontaneous preterm are at risk for EOS warranting evaluation for sepsis and antimicrobial therapy.

Study by Robert JS et al [51]reported that indicated preterm are at higher risk for Group B streptococcal sepsis .Study by Uma S et al [6] reported that in spontaneous preterm following preterm labour with gestational age less than 34 weeks 16.8 % had septicaemia .

In terms of necrotising enterocolitis, this study showed that 3.8% of spontaneous preterm infants had necrotising enterocolitis compared to 0% of indicated preterm infants and this is not statistically significant . Sub grouping of spontaneous and indicated preterm infants into late and early preterm had no statistically significant difference . Bhoomika et al [55] stated that NEC affects 10 % of extremely preterm (< 28 weeks) or extremely low birth weight (<1000 g) infants and 5% of very preterm (28 –31 weeks) or very low birth weight infants (<1500 g) and reported that NEC about 25 % of infants with NEC require surgical intervention and mortality rate is 10 % . Nanthakumar et al [61] stated that preterm infants have higher concentration of inflammatory mediators that contributes to NEC compared to term infants .

Crowley P et al [62] reported that antenatal corticosteroid administration is associated with a reduction in the incidence of RDS and thus lowers the risk of NEC.

Wo´jkowska-Mach et al [65] repoted 8.7 % of preterm infants had NEC and fatality case rate was 22.8%. Retrospective study by Yang LC et al [26] on spontaneous preterm of 16 – 26 weeks gestational age due to PPROM showed that 38 out 73 infants survived .Among the survivors incidence of NEC was 5.3 % and respiratory distress was 100% .

Study by Feldman K et al [29]reported that indicated late preterm infants born following Caesarean section without labour were at increased risk of NEC with Odds Ratio 3.20; 95% CI 1.07 to 9.53)on comparison with spontaneous preterm .

LIMITATIONS OF THIS STUDY

1. Sample size in both groups is low .

2. If a larger sample size was available , the study could have looked at the influence of various maternal factors on morbidity in both group of preterms.

CONCLUSIONS

- Preterm births contribute to 11.4 % of all deliveries (142 of 1242 deliveries). Among them 78 (60 %) were spontaneous preterm and 52 (40 %) were indicated preterm births.

- Indicated preterm infants have increased incidence of hypoglycemia compared to spontaneous preterm infants (P = 0.012) .

- There was no statistically significant difference in the incidence of respiratory morbidity among the two groups. 28.2 % (22 of 78) of spontaneous preterm infants developed respiratory morbidity and 33% (17 of 52) of indicated preterm infants had respiratory morbidity.

- There was no statistically significant difference in the incidence of hyperbilirubinaemia among the two groups .While 68 % (53 of 78) of spontaneous preterm infants had hyperbilirubinaemia and 60 % (31 of 52) of indicated preterm infants had hyperbilirubinaemia.

- There was no statistically significant difference in the incidence of sepsis among the two groups . 11.5 % (9 of 78) of spontaneous preterm infants had sepsis and 19.2% (10 of 52) of indicated preterm infants had sepsis .

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- There was no statistically significant difference in the incidence of necrotising enterocolitis between the two groups . 3.8 % (3 of 78) of spontaneous preterm infants had necrotising enterocolitis and 0% (0 of 52) of indicated preterm infants had necrotising enterocolitis .

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ABBREVIATIONS

RDS	-	Respiratory Distress Syndrome
IVH	-	Intra Ventricular Hemorrhage
CDC	-	Centre Disease Control
NEC	-	Necrotizing Entero Colitis
PMN	-	Poly Morpho Nuclear leucocytes
CSF	-	Cerebro Spinal Fluid
SGA	-	Small for Gestational Age
AGA	-	Appropriate for Gestational Age
LGA	-	Large for Gestational Age
CPAP	-	Continuous Positive Airway Pressure
CRP	-	C Reactive Protein
UTI	-	Urinary Tract Infection

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CONSENT FORM

Institutional Human Ethics Committee
PSG Institute of Medical Sciences and Research, Coimbatore

Parental Consent Form

Title of Study: NEONATAL OUTCOMES AMONG SPONTANEOUS AND INDICATED PRETERM BIRTHS – PROSPECTIVE COHORT STUDY

Name of the Principal Investigator: R V SARANYAA

Department: PAEDIATRICS

Your infant is invited to participate in a study of preterm babies based on their type of birth

My name is **R V SARANYAA** and I am a Post Graduate at PSG Institute of Medical Sciences and Research, Coimbatore. This study is done to know the outcome of preterm babies based on their type of birth. So that it would be an evidence for management of neonatal medical complications in future.

I am asking for permission to include your infant in this study because I expect to have **Minimum 86** participants in the study.

If you allow your child to participate, I will collect medical details from your babies case record.

Any information that is obtained in connection with this study and that can be identified with your infant will remain confidential and will be disclosed only with your permission. His or her responses will not be linked to his or her name or your name in any written or verbal report of this research project.

Your decision to allow your (son/daughter/child/infant/adolescent youth) to participate will not affect your or his or her present or future relationship with PSGIMS&R or PSG Hospitals. If you have any questions about the study, please ask me. If you have any questions later, call me at 94422 17723 If you have any questions or concerns about your (son/daughter/child/infant/adolescent youth)'s participation in this study, call 94422 17723.

You may keep a copy of this consent form.
You are making a decision about allowing your infant to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow him or her to participate in the study. If you later decide that you wish to withdraw your permission for your infant to participate in the study, simply tell me.

You may discontinue his or her participation at any time. *This will not affect in any way your future treatment in this hospital.*

Printed Name of infant:

Signature of Parent(s) or Legal Guardian with Date Signature of Investigator with Date

PROFORMA

BABY DETAILS

- Name : B/o
- Inpatient / Outpatient number :
- Sex : male /female
- Date of birth &time
- Gestational age (confirmed by AN USG/ LMP):
- Birth weight :
- Apgar score at 1 min : at 5 min :
- Ante natal USG : Normal / abnormal

Findings : _____

MATERNAL DETAILS

- Age :
- Parity index :
- Ante partum complications / risk factors :

- Received antenatal steroids : Yes / no

  If yes , number of doses : _____

- Onset of labour : spontaneous / induced

- Mode of induction :

- Mode of delivery : Normal vaginal delivery / Instrumental /LSCS

- Tocolysis : Yes / no

  If yes details : _____

- Antibiotics : Yes / no

  If yes details : _____

PARAMETERS

1) RESPIRATORY MORBIDITY:

- Need for Resuscitation : Yes / No

  If yes , Details : _____

- Surfactant administered : Yes / no

- Ventilator support requirement :

Mode of respiratory support	Duration
Mechanical ventilation	
Continuous positive airway pressure -CPAP	
Oxygen : prongs blender / free flow / hood	

Maximum Ventilator setting required :

- Radiological evidence of respiratory distress :

- Apneic spells : caffeine administration : Yes / No

- TTN / PPHN / Pneumothorax / RDS / others (Specify)

2) NEONATAL HYPERBILIRUBINAEMIA:

Day of onset of clinical jaundice :

Maximum serum bilirubin Total : direct fraction :

Intervention required :

Photo therapy / exchange transfusion / Intravenous Immunoglobulin

Details : _____

3) HYPOGLYCEMIA (Capillary Blood Glucose <40mg/dl) : Yes / No

If yes : symptomatic / asymptomatic

4) SEPSIS

Serial C Reactive protein

Date	Age	values

- Blood culture :
- Urine culture :
- CSF analysis :
- Antibiotics given : Yes / No

If yes Details : _____

- **Central line** : Umbilical catheterization / PICC line

  Duration :

- **Total parenteral nutrition** : yes /no

  Duration

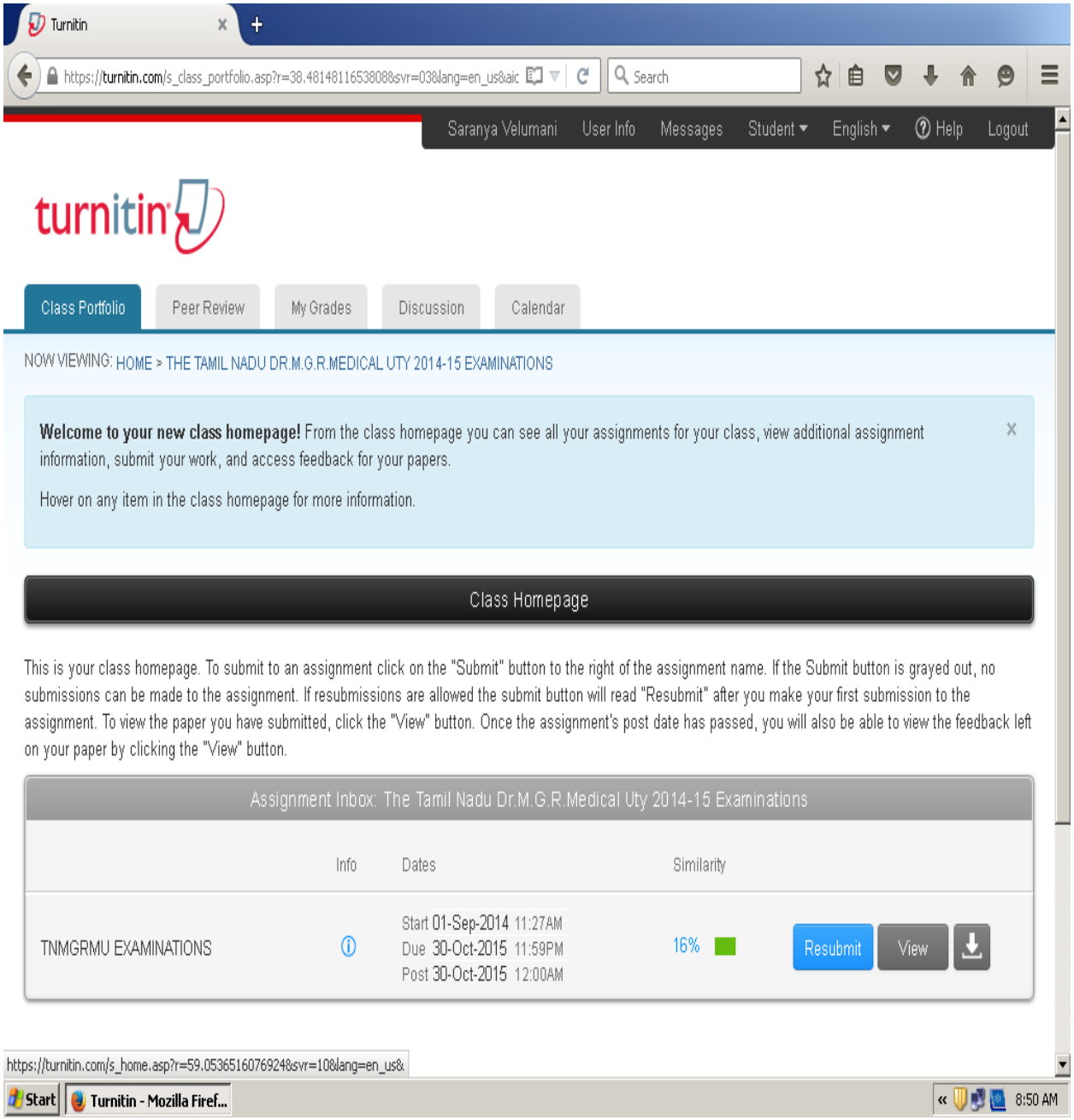
5) NECROTIZING ENTEROCOLITIS : if proven

Details : _____

6) Duration of NICU stay : (in hrs if <72 hrs of life)

7) Final diagnosis :

PLAGIARISM CHART



ஒப்புதல் படிவம்

தேதி :

டாக்டர் ர வே சரண்யா ஆகிய நான், PSG மருத்துவக் கல்லூரியின் குழந்தைகள் நல துறையின் கீழ் PSG மருத்துவமனையில் குறை மாதத்தில் பிறக்கும் ஸ்பான்ட்டேனியஸ் மற்றும் இன்டிகேட்டடு குழந்தைகளைப் பற்றிய ஆய்வு மேற்கொள்ள உள்ளேன்.

என் ஆய்வு வழிகாட்டி: டாக்டர். சாரா பால்

ஆய்வு மேற்கொள்வதற்கான அடிப்படை: குறை மாதத்தில் பிறக்கும் குழந்தைகளுக்கு ஏற்படும் பிரச்சனைகளும் அதனால் ஏற்படும் விளைவுகளும் அவர்கள் ஸ்பான்ட்டேனியஸ் அல்லது இன்டிகேட்டடு என்ற பிரிவின் அடிப்படையில் வேறுபாடு உள்ளது அதனால் முன்னரே அவர்களுக்கு அளிக்கப்பட வேண்டிய சிகிச்சைகளைப் பற்றி அறிந்து கொள்ளலாம்,

ஆய்வின் நோக்கம்: குறை மாதத்தில் பிறந்த குழந்தைகளை ஸ்பான்ட்டேனியஸ் மற்றும் இன்டிகேட்டடு என பிரிவுபடுத்தி அவர்களுக்கு ஏற்படும் சுவாச கோளாறு மற்றும் பிற பிரச்சனைகள் மற்றும் அதன் விளைவுகள் ஆகியவற்றை ஒப்பிட்டு அதனை ஆராய்வதுதான் இந்த ஆய்வின் நோக்கம்.

ஆய்வில் பங்கு பெறும் நபர்களின் எண்ணிக்கை: 86

ஆய்வு மேற்கொள்ளும் இடம் : குழந்தைகள் நலப் பிரிவு, **PSG** மருத்துவமனை மற்றும் மருத்துவக்கல்லூரி

ஆய்வின் பலன்கள் : இந்த ஆய்வை மேற்கொள்வதன் மூலம் குறை மாதத்தில் பிறக்கும் குழந்தைகளுக்கு ஏற்படும் பிரச்சனைகள் பற்றி அறிந்து கொள்ளலாம்.

இந்த ஆய்வினால் எந்த வித அசௌகரியங்கள் அல்லது பக்கவிளைவுகள் எதுவும் ஏற்படாது.

இந்த ஆய்வில் கிடைக்கும் தகவல்கள் ஐந்து வருடங்கள் பாதுகாக்கப்படும், இவை வேறு எந்த ஆய்விற்கும் பயன்படுத்தப்பட மாட்டாது. எந்த நிலையிலும் உங்களைப் பற்றிய தகவல்கள் யாருக்கும் தெரிவிக்கப்பட மாட்டாது. அவை இரகசியமாக வைக்கப்படும்.

இந்த ஆய்வில் பங்கேற்க ஒப்புக்கொள்ளுதல் எந்த விதமான பலனும் உங்களுக்கு கிடைக்காது. எந்த நேரத்தில் வேண்டுமானாலும் ஆய்விலிருந்து விலகிக்கொள்ளும் உரிமை உங்களுக்கு உண்டு.

ஆய்விலிருந்து விலகிக்கொள்வதால் உங்களுக்கு அளிக்கப்படும் சிகிச்சையில் எந்த வித மாற்றமும் இருக்காது.

இந்த ஆராய்ச்சிக்காக உங்களிடம் சில கேள்விகள் கேட்கப்படும். இரத்த மாதிரிகள் அல்லது திசு மாதிரிகள் எடுக்கப்படமாட்டாது.

மேலும், இந்த ஆய்வில் பங்கு கொள்வது உங்கள் சொந்த விருப்பம். இதில் எந்த விதக் கட்டாயமும் இல்லை. நீங்கள் விருப்பப்பட்டால், இந்த ஆய்வின் முடிவுகள் உங்களுக்கு தெரியப்படுத்தப்படும்.

ஆய்வாளரின் கையொப்பம் :

தேதி :

<u>ஆய்வுக்குட்படுபவரின் ஒப்புதல் :</u>

நான் இந்த ஆராய்ச்சியின் நோக்கம் மற்றும் அதன் பயன்பாட்டினைப் பற்றி தெளிவாகவும், விளக்கமாகவும் தெரியப்படுத்தப் பட்டுள்ளேன். இந்த ஆராய்ச்சியில் பங்கு கொள்ளவும், இந்த ஆராய்ச்சியின் மருத்துவ ரீதியான குறிப்புகளை வரும் காலத்திலும் உபயோகப்படுத்திக் கொள்ளவும் முழு மனதுடன் சம்மதிக்கிறேன்.

ஆய்வுக்குட்படுபவரின் பெயர், முகவரி :

கையொப்பம் :

தேதி :

ஆய்வாளரின் தொலைபேசி எண்: 94422 17723

மனித நெறிமுறைக் குழு அலுவலகத்தின் தொலைபேசி எண்: 0422 434 5818

MASTER CHART

S.NO	IPNO.	GES. AGE	SP/ IND	WT kg	A/S/ L GA	AN STER	RESPIRATORY PARAMETER			NNJ	SEPSIS		HYPO GLYCAEMIA		NEC	AMA
						DOSE	RESUSCI TATION	SUPPORT	DIAGNOSIS		proven	Probable	ASYMP	SYMP		
	LATE PRETERM : 34 TO 36+6 WEEKS OF GESTATIONAL AGE															
1	14/24806	36+3	IND	1.65	SGA	0	BMV	NO	PND	PT	NO		NO		NO	
2	14/24907	36	IND	1.59	SGA	0	NO	NO	N	PT	NO		D1		NO	
3	14/25041	36+4	SP	2.61	AGA	0	NO	NO	N	NO	NO		NO		NO	
4	14/25694	36+5	IND	2.81	AGA	0	NO	NO	N	NO	NO		NO		NO	
5	14/26023	36+1	IND	3.35	AGA	0	NO	NO	N	NO	NO		NO		NO	
6	14/26051	35+4	IND	2.15	SGA	0	NO	NO	N	NO	NO		D1		NO	
7	14/26293	36+2	SP	2.74	AGA	0	NO	NO	N	NO	NO		NO		NO	
8	14/26314	35+5	IND	2.3	AGA	0	NO	NO	N	NO	NO		D1		NO	
9	14/26329	34+5	SP	2.08	AGA	2	NO	CPAP	TTNB	PT	NO		NO		NO	
10	15/05783	36+5	IND	2.83	AGA	0	NO	NO	N	PT	NO		NO		NO	
11	14/26428	36+1	SP	2.98	AGA	2	NO	NO	N	PT	NO		D1		NO	
12	14/26561	36+4	IND	1.77	SGA	0	NO	NO	N	NO	NO		NO		NO	
13	14/26554	36+5	IND	2.38	SGA	0	NO	NO	N	NO	NO		D1		NO	
14	14/26687	36+6	IND	2.27	SGA	0	NO	NO	N	PT	NO		NO		NO	
15	14/26609	35+5	SP	1.88	SGA	0	NO	NO	N	PT	NO		NO		NO	
16	14/26781	35+3	IND	2.91	AGA	0	NO	NO	N	NO	NO		NO		NO	
17	14/27157	35	SP	1.87	SGA	0	NO	NO	N	PT	NO		D2		NO	
18	14/27348	35+6	IND	2.34	AGA	0	NO	NO	N	PT	NO		NO		NO	
19	14/27502	35+5	SP	2.74	AGA	1	NO	CPAP	APNEA	NO	NO		NO		NO	

20	14/27563	36+2	IND	2.26	AGA	0	NO	NO	N	PT	NO		NO		NO	
21	14/27583	34	IND	1.73	SGA	0	BMV	NO	PND	PT	NO		NO		NO	
22	14/27761	36	SP	3.07	AGA	0	NO	NO	N	PT	NO		NO		NO	
23	14/27736	36+2	IND	2.79	AGA	0	NO	NO	N	NO	NO		NO		NO	
24	14/27864	34+3	SP	1.86	AGA	2	BMV	CPAP	N	PT		YES	NO		NO	
25	14/28180	34+3	IND	1.36	SGA	0	NO	NO	N	NO		YES	NO		NO	
26	14/28231	36+5	SP	2.65	AGA	0	NO	BLENDER	RDS	PT	NO		NO		NO	
27	14/28253	34	SP	2.18	AGA	2	NO	CPAP	N	PT	NO		NO		NO	
28	14/28375	36+1	SP	3.06	AGA	0	NO	NO	N	PT	NO		NO		NO	
29	14/28388	34+5	SP	2.05	AGA	0	NO	NO	N	PT	NO		NO		NO	
30	14/28549	36+5	IND	1.37	SGA	0	ET MSL NV	NO	PND	PT		YES	NO		NO	
31	14/29049	35+2	SP	2.11	AGA	2	NO	NO	N	PT	NO		NO		NO	
32	14/29078	36+6	SP	2.19	SGA	0	NO	NO	N	PT	NO		NO		NO	
33	14/29171	36	IND	2.08	SGA	0	NO	NO	N	PT	NO		NO		NO	
34	14/29272	34+2	SP	2.05	AGA	2	NO	NO	N	PT	NO		NO		NO	
35	14/29183	35+6	SP	2.24	AGA	1	NO	NO	N	PT	NO		NO		NO	
36	14/29501	36+5	SP	2.49	AGA	0	NO	NO	N	NO	NO		NO		NO	
37	14/29567	36+6	SP	2.93	AGA	0	NO	NO	N	NO	NO		NO		NO	
38	14/29593	36+1	SP	3.49	LGA	0	NO	NO	N	NO	NO		NO		NO	
39	14/29638	35+3	IND	2.31	AGA	2	NO	NO	N	PT	NO		NO		NO	
40	14/29651	36+2	SP	2.55	AGA	1	NO	NO	N	NO	NO		NO		NO	
41	14/29735	36+1	SP	2.91	AGA	0	NO	NO	N	PT	NO		NO		NO	
42	14/30401	35+3	SP	2.89	AGA	0	NO	NO	N	NO	NO		NO		NO	
43	14/30489	35+3	SP	1.97	SGA	2	NO	NO	N	PT	NO		NO		NO	
44	14/30578	36+5	SP	2.38	SGA	3	NO	NO	N	NO	NO		D3		NO	
45	14/30621	36+5	SP	2.77	AGA	0	NO	NO	N	NO	NO		NO		NO	
46	14/30561	36	SP	2.31	AGA	0	NO	NO	N	PT	NO		NO		NO	
47	14/30554	36+6	SP	2.74	AGA	0	NO	NO	N	NO	NO		NO		NO	
48	14/30891	34+4	IND	1.58	SGA	0	NO	NO	N	PT	NO		NO		NO	

49	14/31333	34+5	SP	2.97	AGA	0	NO	NO	N	NO	NO		NO		NO	
50	14/31325	34+4	SP	3.02	AGA	1	FF02	NO	PND	PT	NO		NO		NO	AMA-D7
51	14/31602	34+1	SP	1.78	SGA	2	NO	CPAP	TTNB	PT	NO		NO		NO	
52	14/31739	36+4	SP	2.46	AGA	0	NO	NO	N	PT	NO		NO		NO	
53	14/32254	34+6	SP	2.1	AGA	1	NO	NO	N	PT	NO		NO		NO	
54	14/32426	36+4	SP	2.69	AGA	0	NO	NO	N	NO	NO		NO		NO	
55	14/33250	35+5	IND	2.66	AGA	2	NO	NO	N	N	NO		NO		NO	
56	14/33361	36+1	SP	2.6	AGA	0	BMV	BLENDER	PND	PT		YES	NO		NO	
57	14/33501	34+6	SP	1.92	SGA	1	NO	BLENDER	TTNB	N	NO		NO		NO	
58	14/33504	35+5	SP	2.39	AGA	0	NO	NO	N	PT	NO		NO		NO	
59	14/33744	36+3	SP	1.98	SGA	0	NO	NO	N	PT	NO		NO		NO	
60	14/33631	34+5	SP	2.62	AGA	0	NO	NO	TTNB	PT	NO		NO		NO	
61	14/33754	34+6	SP	2.29	AGA	0	NO	NO	N	PT	NO		NO		NO	
62	14/33754	36+4	SP	3.37	AGA	0	NO	NO	N	N0	NO		NO		NO	
63	14/33851	36+4	IND	2.47	AGA	0	NO	NO	N	NO	NO		NO		NO	
64	14/34153	35+3	IND	2.29	AGA	0	NO	NO	N	PT	NO		NO		NO	
65	14/34205	36+3	IND	3.27	AGA	0	NO	NO	N	PT	NO		NO		NO	
66	14/34221	35+1	SP	2.27	AGA	1	FF02	BLENDER	TTNB	PT	YES		D1		STAGE2A	
67	14/34390	35+6	IND	2.09	SGA	0	NO	BLENDER	TTNB	NO	NO		NO		NO	
68	14/34894	35+6	IND	2.48	AGA	0	NO	NO	N	PT	NO		NO		NO	
69	14/35002	36+4	IND	2.71	AGA	0	NO	NO	N	NO	NO		NO		NO	
70	14/34929	35+5	IND	2	SGA	1	NO	NO	N	NO	NO		NO		NO	
71	14/35313	36+5	SP	3.32	AGA	0	FF02	NO	RDS	PT	NO		NO		NO	
72	14/35394	36+6	SP	2.65	SGA	0	NO	NO	N	NO	NO		NO		NO	
73	14/35726	36+2	SP	2.7	AGA	0	NO	NO	N	PT	NO		NO		NO	
74	14/35745	36+3	SP	2.99	AGA	0	NO	MV -SURF	RDS	PT	NO		NO		NO	
75	14/35638	36+3	SP	2.05	SGA	2	NO	NO	N	PT	NO		NO		NO	
76	14/35805	36	IND	2.08	SGA	2	NO	NO	N	NO	NO		D1		NO	

77	14/36258	36+6	IND	3.42	AGA	0	NO	NO	N	PT	NO		D1		NO	
78	14/36616	36+6	SP	2.54	SGA	2	NO	NO	N	NO	NO		NO		NO	
79	14/37171	36+6	IND	2.8	AGA	0	NO	NO	N	NO	NO		NO		NO	
80	14/37616	35+5	IND	1.92	SGA	0	BMV	CPAP	RDS II	PT		YES	NO		NO	AMA-D4
81	15/01357	36+2	IND	2.75	AGA	0	NO	NO	N	NO	NO		NO		NO	
82	15/01368	35	IND	1.65	SGA	2	FF02	NO	RDS	PT	NO		D5		NO	
83	15/01235	34+6	IND	2.11	SGA	2	NO	NO	N	PT		YES	D1		NO	
84	15/01655	36	SP	3.04	AGA	0	NO	NO	N	PT	NO		D3		NO	
85	15/01937	35+6	IND	1.5	SGA	2	NO	NO	N	PT	YES		D1		NO	
86	15/01986	35+1	IND	1.73	SGA	2	FF02	NO	RDS	PT	NO		D1		NO	
87	15/02001	36+3	IND	2.44	SGA	0	NO	NO	N	NO	NO		NO		NO	
88	15/02176	34+6	SP	2.24	AGA	2	NO	NO	N	PT	NO		NO		NO	
89	15/02292	34+6	SP	1.63	SGA	0	NO	NO	N	PT		YES	D1,D4,5		NO	
90	15/02272	35+1	SP	2.78	AGA	0	NO	NO	N	NO	NO		D1,2		NO	
91	15/02302	34+2	SP	1.86	SGA	0	NO	NO	N	PT	NO		NO		NO	
92	15/02362	36+1	IND	2.42	SGA	0	FF02	NO	RDS	PT	NO		NO		NO	
93	15/02790	35+6	IND	2.74	AGA	1	BMV	CPAP	RDS II	PT		YES	D1		NO	AMA - D16
94	15/03447	36+3	IND	2.42	SGA	0	NO	NO	N	PT		YES	NO	D1	NO	
95	15/03396	35+4	SP	2.85	AGA	0	NO	NO	N	NO	NO		NO		NO	
96	15/03678	36	SP	2.37	AGA	0	NO	NO	N	NO	NO		NO		NO	
97	15/03779	34	IND	1.7	SGA	0	BMV	NO	PND	PT	NO		NO		NO	
98	15/04377	35+6	SP	2.86	AGA	2	NO	NO	N	PT	NO		NO		NO	
99	15/04418	36	IND	1.72	SGA	0	NO	NO	N	PT	NO		NO		NO	
100	15/04721	36+4	SP	2.5	AGA	0	NO	NO	N	NO	NO		NO		NO	
101	15/05034	34	IND	2.65	AGA	0	NO	BLENDER	RDS	NO	NO		D1		NO	
102	15/05014	35+1	IND	2.36	AGA	0	NO	NO	N	NO	NO		NO		NO	
103	15/05013	36+1	IND	3.88	LGA	0	NO	NO	N	PT	NO		D1		NO	
104	15/05186	34+6	IND	1.6	SGA	1	NO	CPAP	RDS II	PT	YES		NO		NO	
105	15/05351	36+3	SP	2.83	AGA	0	NO	NO	N	NO	NO		NO		NO	

106	15/05408	36+4	SP	2.61	AGA	0	NO	NO	N	NO	NO		NO		NO	
107	15/05634	36	SP	2.03	SGA	0	NO	NO	N	PT	NO		NO		NO	
EARLY PRETERM LESS THAN 34 WEEKS OF GESTATIONAL AGE																
108	14/25936	33+6	SP	1.91	AGA	1	NO	NO	N	PT	NO		NO		NO	
109	14/26239	31+2	IND	880 G	SGA	0	NOEPUF F	CPAP	RDS	N0	NO		NO		NO	
110	14/26400	28	SP	1.11	AGA	1	NO	SIMV	AOP /CAF	PT	YES A.U		NO		NEC II	
111	14/27296	33+4	IND	2.12	AGA	0	ET /FLUID	MV	HMD	PT	NO	YES	NO		NO	
							BOLUS,	SURFACT	HIE II							
							MV, ADR									
112	14/27500	32+3	SP	1.44	SGA	0	NO	CPAP	RDS	PT	NO		NO		NO	AMA - D3
113	14/28773	31+5	SP	1.73	AGA	2	BTUBE V	BLENDER	PND	PT	NO		NO		NO	
114	14/29707	30	SP	1.25	AGA	0	BTUBE V	MV	RDS	NO	NO		NO		NO	AMA- D1
115	14/29771	33+5	SP	1.85	AGA	2	NO	NO	N	PT	NO		NO		NO	
116	14/29768	33+1	SP	1.93	AGA	1	FFO2	CPAP	RDS II	PT	NO		D1		NO	AMA- D9
117	14/31245	30+1	SP	1.35	AGA	2	BMV	CPAP	AOP/CAF	PT	NO		NO		NO	
118	14/31755	33	SP	1.47	SGA	0	NO	CPAP	RDS II	NO	YES		NO		NEC 2B	
119	14/33064	32	IND	1.16	SGA	1	NO	CPAP	AOP/CAF	PT	NO		NO		NO	
120	14/33386	33+4	IND	2.27	AGA	0	BMV	CPAP	AOP/CAF	PT	YES		NO		NO	
121	14/33630	30+5	SP	1.23	AGA	0	BMV	CPAP	AOP/CAF	PT		YES	NO		NO	
122	14/33873	28	SP	960 G	AGA	0	NO	SIMV	AOP/CAF	PT	YES		D1		NO	
123	14/34932	33+1	IND	1.51	SGA	1	NO	CPAP	RDS	PT	NO		D1,2		NO	
124	14/35840	32+6	SP	2.02	AGA	1	NO	CPAP	RDS II	PT	NO		NO		NO	
125	15/02236	32+1	SP	1.45	AGA	1	NO	NO	N	PT	NO		NO		NO	
126	15/03525	33	SP	2.17	AGA	1	NO	NO	N	PT	NO		NO		NO	

127	15/03569	30+1	SP	1.49	AGA	2	NO	CPAP	AOP/CAF	PT	NO		NO		NO	
128	15/04405	33+5	IND	2.35	AGA	0	NO	NO	N	PT	NO		NO		NO	
129	15/04406	30+4	SP	1.58	AGA	2	NO	NO	N	PT		YES	NO		NO	
130	15/05754	33+3	SP	1.84	AGA	0	NO	NO	N	PT	NO		NO		NO	

SP	Spontaneous
IND	Indicated
FFO2	free flow oxygen
BMV	bag and mask ventilaton
BTV	bag and tube ventilation
CPAP	continuous positive airway pressure
SIMV	synchronised intermittent mechanical ventilation
RDS II	respiratory distress syndrome type 2
AOP	apnoea of prematurity
CAF	Caffeine
PT	photo therapy
AMA	against medical discharge
ROP	retinopathy of prematurity
HMD	hyaline membrane disease
SURFACT	Surfactant
PND	perinatal depression
TTNB	Transient tachypnoea of newborn
NEC	necrotising enterocolitis
NNJ	neonatal jaundice
GES.AG	gestational age
ASYMP	Asymptomatic
SYMP	symptomatic